

S3

.J683

LIBRARY OF THE
AMERICAN MUSEUM OF NATURAL HISTORY

The Journal

OF THE

Ministry of Agriculture

OCTOBER, 1921.

PRINCIPAL CONTENTS.

(For Complete List of Contents see page xv.)

	PAGE
The Agricultural Labourer in the Early 19th Century. <i>J. L. Hammond</i>	585
Improvement of Dairy Cattle in Denmark. <i>Harald Faber</i>	598
Pigs for Pork. <i>Sanders Spencer</i>	608
Roots v. Silage for Dairy Cows. <i>A. W. Oldershaw, B.Sc., and F. C. Smith, B.A.</i>	614
Home Curing of Bacon. <i>Mrs. C. E. Curtoys</i>	622
Royal Commission on Importation of Store Cattle	626
Insecticides and Fungicides	628
Dorsetshire Arts and Crafts, 1921. <i>Miss M. B. Mansel</i>	632
Agricultural Statistics: Their Collection and Use. <i>Sir Henry Reev, K.C.B.</i>	636
A Fruit Demonstration Station in East Sussex. <i>A. H. Hoare</i>	645
The Strawberry Crop, 1921	648
Control of "Damping Off" and "Foot Rot" of Tomatoes. <i>W. F. Bewley, D.Sc.</i>	653
Protection against Fungi from Abroad. <i>Mrs. N. L. Alcock</i>	655
Licensing Stallions under the Horse Breeding Act, 1918	660
Notes on Manures for October. <i>E. J. Russell, D.Sc., F.R.S.</i>	664
Notes on Feeding Stuffs for October. <i>E. T. Halnan, M.A., Dip. Agric. (Cantab.)</i>	668



LONDON:

PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S STATIONERY OFFICE,
AND PUBLISHED BY THE MINISTRY OF AGRICULTURE AND FISHERIES.

(To be obtained from the Ministry's Offices, 10, Whitehall Place, London, S.W.1.)

EDITORIAL AND
PUBLISHING OFFICES:

10, WHITEHALL PLACE,
LONDON, S.W.1.

MONTHLY.

[PRICE SIXPENCE.]

Post free.

AGENTS FOR ADVERTISEMENTS:

C. VERNON & SONS, Ltd.,
38, Holborn Viaduct, E.C.1;
58/62, South Castle Street, Liverpool.

BY TO
MUSEUM HADJIRAMA
YEDIEH JALUYAH TO

LIME

BUY ONLY THE BEST.

The BUXTON LIME FIRMS Co., Ltd.,

ROYAL EXCHANGE, BUXTON.

Telegrams—BUXTON LIME, BUXTON. 'Phone—312 BUXTON.

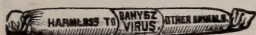
THE PUREST LIME KNOWN IN
COMMERCE AND THE LARGEST
OUTPUT OF LIME AND LIMESTONE
IN THE WORLD.

LIME BURNT IN SPECIAL KILNS FOR
SPECIAL TRADES.

Agriculturists, Florists and Fruit Growers
catered for specially.

AGENTS THROUGHOUT GREAT BRITAIN.

Lime in any Form, in any Quantity to suit Users.



We've got no
work to do.

Certain Destruction to Rats and Mice

by the well known preparations

DANYSZ VIRUS, MALLER'S EXTRACT of SQUILL, DANZO RAT KILLER.

Write for particulars to the Proprietors,

MALLER LABORATORIES LIMITED

(formerly Danysz Virus Limited),

325, Borough High Street, London, S.E.1.

POTASH — PROFIT

The
Richest Potash
in the World
comes from France.

All grades are supplied.

The price of Potash from France
has fallen much faster than
the price of farm products,
so you may feel assured
you can get a profit from
its use.

**Now is the Time to
Manure your Grassland**

FRENCH KAINIT 14%

POTASH MANURE SALTS { 20 %
30 %

MURIATE OF POTASH { 50 % (K_2O)
60 % "

SULPHATE OF POTASH { 90 % Purity
96 % "

For Supplies and Quotations apply to your Manure Merchant.

Free copies of publications from

The Alsace-Lorraine Development & Trading Co., Ltd.
Pinner's Hall, Old Broad St., London, E.C.2.

FRENCH KAINIT 14%
has proved to be
one of the most
effective Manures
ever used on Grass-
land. Try it and you
will see for yourself!

PILCHERS STOPROT

The Finest Wood Preservative for all Purposes



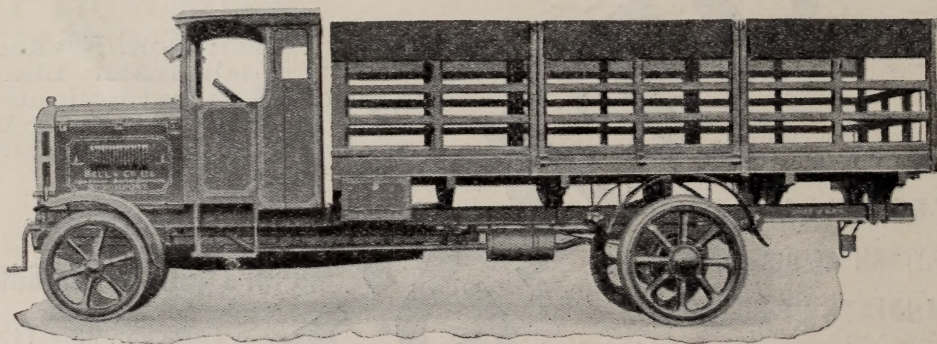
Treating Sections of Army Huts with PILCHERS STOPROT.

(Contractors, W. PATTINSON & SONS, Ltd., Ruskington, near Skeaford).

PILCHERS, Ltd., MORGAN'S LANE, LONDON, S.E.



3, 4, 5 and 6 Ton Motor Wagons.



20 years' specialisation.

12 months' guarantee.

THE MAUDSLAY MOTOR Co. Ltd.

Works:—Coventry.

London Office, 89, Union Grove, S.W. 8.

THE RAT PLAGUE

is a national menace. You are not only encouraging these vermin to the danger of the public health, but

YOU ARE LOSING MONEY ALL THE TIME

when you use building material that rats can gnaw through and which will provide breeding places for them.

CONCRETE FLOORS

ARE

**VERMIN PROOF,
CLEAN AND SANITARY,**
and will pay for themselves over and over again.

For information apply to the

CONCRETE UTILITIES BUREAU,

DEPT. 1B,

35, GREAT ST. HELENS, LONDON, E.C. 3,

who will send you pamphlets on this subject, post free.

The EVER READY Gas Pasteurizer

(Patented.)

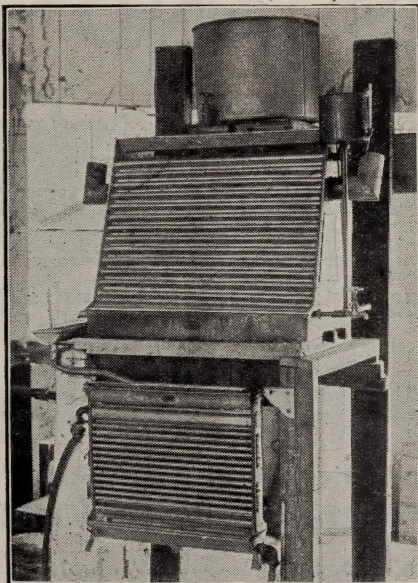
Don't Buy a
Pasteurizer until
you have seen
Ours.

Be Up-to-Date!
Pasteurize your
Milk.

No Complaints,
No Sour Milk,
No Trouble,
and every Machine
Guaranteed.

In reply to this advert. please
state Dept. "B."

This illustration shows complete
arrangement of the
Pasteurizer with Milk Pan
and Cooler.



Simply connect Machine
to a Gas Meter and

Start the Good Work

**IMMEDIATE
DELIVERY.**

Capacity:
50 gallons per hour at
a cost of 1d. per gal-
lon.

Now is the time
during the
Hot Weather.

Why not inspect one
at—

DAIRY SUNDRIES, LTD.

Managing Director—F. WALENN,

KNOTT'S GREEN, LEYTON, E.10.

W'stow
188.

ANGLO'S VAPORISING OIL



The official fuel at the Lincoln Tractor Trials, Anglo's Vaporising Oil, is ideal for every Farm and Home purpose where reliable fuel for power is needed.

It gives maximum efficiency and is particularly suited for Engines using Vaporising Oil for Ploughing and General Field work, Sawing, Churning and Dairy work, Hauling, Grinding and Threshing, &c. Also for generating electric light for household or business purposes.

Use only Anglo's Vaporising Oil, which gives the cleanest running with consistent power at minimum cost.

Anglo's Vaporising Oil creates reliable power
for all kinds of labour-saving machinery.
OBTAINABLE EVERYWHERE.

ANGLO-AMERICAN OIL CO., LTD., 36, Queen Anne's Gate, London, S.W.1.

SACKS AND BAGS AND JUTE GOODS OF ALL DESCRIPTIONS.

For all purposes. For Home and Foreign Markets.

J. DE PAIVA & CO.,

(Principal—P. PARNHAM.)

11k, Drury Lane, LIVERPOOL, England.

Telegrams: "Depaiva, Liverpool."

Telephone: Bank 1343 (2 lines).

London Office:

165, Mansion House Chambers, 11, Queen Victoria Street, London, E.C.4.

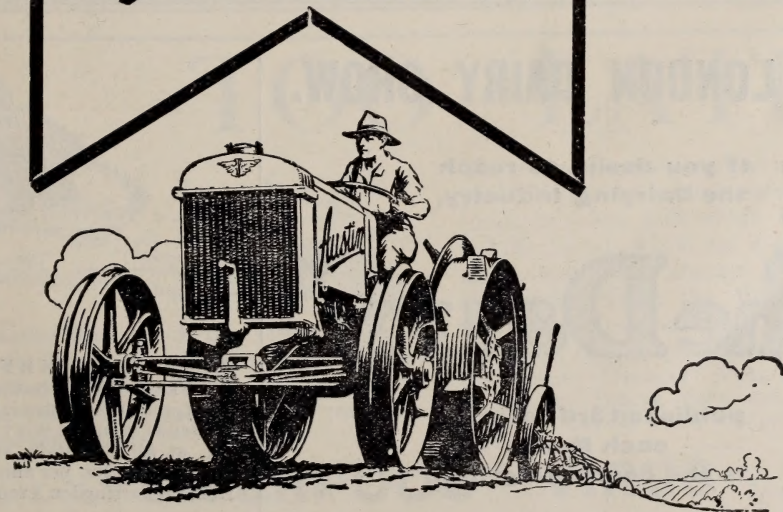
**"There are few farms
where the land is
all a dead level—"**

and that is precisely why, on so *many* farms, you will find the Austin Lightweight Tractor—the lightweight tractor with the powerful drawbar pull.

The Austin is designed and built for profitable farming under all conditions. No matter what gradients you have to cope with, no matter what the soil—the Austin can, and *will* increase your profits.

*Arrange with the nearest Austin
Distributor for a demonstration
ON YOUR OWN FARM.*

Austin
LIGHTWEIGHT
TRACTOR



Write for **FREE Booklet, "TRACTOR FARMING."**

THE AUSTIN MOTOR CO., LTD.

Head Office — — NORTHFIELD, BIRMINGHAM.

LONDON: 479-483, OXFORD STREET, W.1.

And at BRUSSELS

MANCHESTER: 130, DEANS GATE.

& LIANCOURT.

**SOUTH METROPOLITAN GAS COMPANY'S
DRY NEUTRAL SULPHATE of AMMONIA**

**LIGHTENS AND SECURES A BUMPER HARVEST
WORK**



**It is Dry - It does not Cake
- - It is Acid-free. - -
It does not absorb Atmospheric
- - Moisture - -
It can be readily Drilled into
- - the Soil - -**

*It is guaranteed to contain
25½ % Ammonia.*

*For prices and all details apply to:
(Department M.A.)
South Metropolitan Gas Company,
709, OLD KENT ROAD, LONDON, S.E.15.*

SULPHATE

THE LONDON DAIRY SHOW.

**If you desire to reach
the Dairying Industry,**

"The Dairy"

**published 3rd Saturday
— each Month —
is the connecting link.**

This Monthly Journal, established 32 years, circulates among Dairy Farmers, Cowkeepers, Dairymen, Creameries, Dairy Factories, and general Agriculturists throughout the World.

INVALUABLE TO ADVERTISERS.

Rates and Particulars from :—

21, Farringdon Avenue, London, E.C.4.

FREEMASONRY.— "THE FREEMASON," the Organ of the Craft, and oldest Masonic journal in existence, is on sale every Saturday, 3d., at all Bookstalls and Newsagents. Or 20s. per ann. post free from 21, Farringdon Avenue, E.C.4.

An Announcement of Interest to

**PROGRESSIVE FARMERS, ESTATE
AGENTS, COLONISTS & PLANTERS
AGRICULTURAL COLLEGES, etc.**

regarding

DRAINAGE AND IRRIGATION SCHEMES.

A reliable Levelling Instrument is essential to success in projects of even moderate size. At the same time there is no need to engage a professional Surveyor if you have one of our

Farm Levelling Outfits.

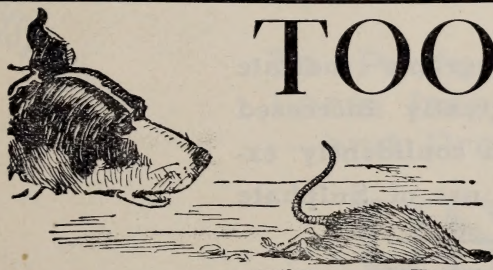
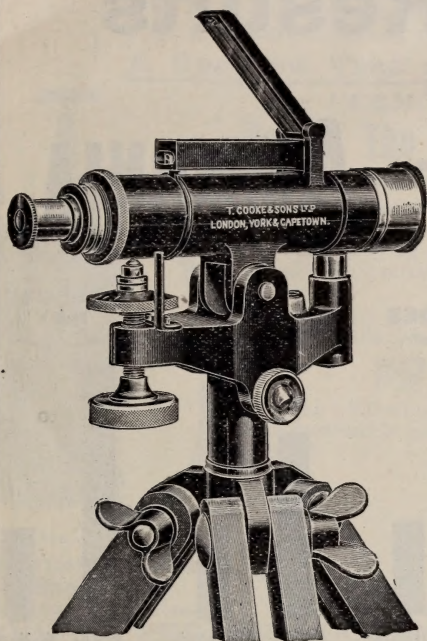
No skill required to manipulate, yet accurate in use.

PRICES—

LEVEL, complete in box, with tripod, £8 10s.
Special STAFF for use with same, £2 16s.

Our Leaflet No. 504, giving full particulars, sent free on request.

T. Cooke & Sons, Ltd.,
Buckingham Works, YORK.



TOO LATE!

No matter how quick the terrier or how efficient your traps, poisons and ferrets, you will never keep pace with the growth of the rat colonies by means of any of these one-at-a-time killers.

The safe and speedy method is "Liverpool" Virus which when eaten by rats (mice or voles) kills within ten days. It kills the rats which eat it and those which come into contact with them afterwards. Once the Virus is laid very few rats escape.

There is no danger. Thousands of tests have proved that "Liverpool" Virus is harmless to Humans, Poultry, Farm and Domestic Animals. You can use it with perfect safety anywhere.

"LIVERPOOL" VIRUS

*Regd.
Trade Mark.*

**HARMLESS
TO
HUMANS
POULTRY
& DOMESTIC
ANIMALS**

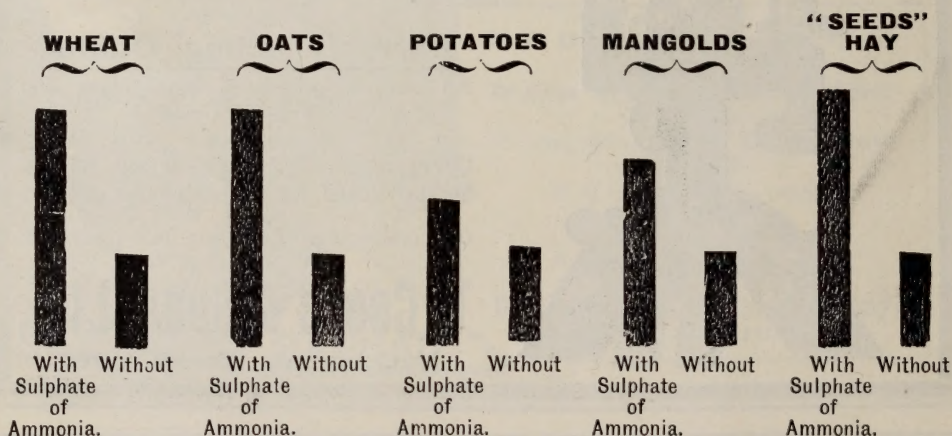
**READY BAITED IN TINS: For mice only, 1/6 ;
Stronger for Rats or Mice, 2/6 and 6/-.**
**NOV BAITED IN TUBES: For Mice only, 1/6 ;
Stronger for Rats or Mice, 2/6 and 8/-.**

"LIVERPOOL" VIRUS is obtainable from all Chemists, or direct from EVANS SONS LESCHER & WEBB, LTD., 56, Hanover Street, Liverpool, and 60, Bartholomew Close, London, E.C.1. The Manufacturers will gladly give free advice on any question regarding rodent extermination.

Proved Results

FROM

SULPHATE OF AMMONIA.



The above diagrams indicate clearly the greatly increased yields you can confidently expect from the use of Sulphate of Ammonia——

**The Nitrogenous Fertiliser that is not washed out of the soil by
——winter rains.——**

Write for Booklet giving full particulars of yields upon which above diagrams are based.

BRITISH SULPHATE OF AMMONIA FEDERATION, LTD.,
G.P.O. BOX 50, FISHERGATE, PRESTON, LANCs.

Winter Spraying and Limewashing.

- ✓ A Clean Cow Shed means a Clean Cow.
- ✓ A Clean Stable means a Clean Horse.
- ✓ A Clean Kennel means a Clean Dog.

A Sprayed Tree means a Heavy Crop.

The VERMOREL "ECLAIR" Series.

No. 3. The "Salva" Sprayer and Limewasher.

No. 8. Extension Lances, 3 ft. 3 in., 9 ft. 9 in., and 13 ft. long.

The "Salva" is an ideal machine for general work. It is made of a special brass alloy, which will withstand the action of LIME SULPHUR and other spraying preparations and it is fitted with an AGITATOR which prevents thick mixtures settling. A strainer lance keeps the nozzle from choking.

Extension Lances can be supplied with this machine to enable tall trees and walls to be sprayed.

**WATCH THIS SPACE EVERY MONTH
FOR A DIFFERENT TYPE OF SPRAYER.**

The following **Spraying and Limewashing Machines** were described in previous issues of this Journal:—

March ...	Knapsack, 3½ gallons.
April ...	Hand, 3½ pints.
May ...	Bucket, 3½ gallons.
June ...	Single wheeled, 6½ gallons.
July ...	Horse drawn pneumatic, 66 gallons.
August ...	DRY SPRAYERS, Hand-Knapsack-Horse-Drawn.
September ...	2 wheeled, 22 gallons.

Full particulars and catalogues from—

COOPER, PEGLER & CO., Ltd., 24b, Christopher St., E.C.2.



"Salva," 3½ gallons.

All Types Made and Stocked.

3½ pints to 66 gallons.

DISTEMPERS

**To Protect Your
Farm Implements
— and Property —**

VARNISHES

USE CARSON'S PURE PAINTS

FOR PATTERNS & PARTICULARS WRITE
Walter Carson & Sons,
GROVE WORKS . . BATTERSEA, S.W.11.

Telephone—BATTERSEA 1630 (2 lines).

also at

BACHELOR'S WALK, DUBLIN.

PAINTS

ENAMELS

How to make your own Concrete bricks and slabs

For Silos, buildings, fence posts for the farm

Cyclops blocks made on Cyclops Machines have been in use in almost every part of the world during the past fourteen years without our receiving a single complaint. They have erected Picture Houses, Carnegie Library, Garages, Silos, and hundreds of buildings of all kinds, and are now being used in the construction of Railway Stations in Nigeria.

Any man can learn how to operate the machines and to build with the blocks by using our mortar gauge which we have patented. This enables an even quantity of mortar to be placed on each block, ensures alignment, and enables unskilled men to build both in blocks, slabs, or bricks after a week's tuition.

We exhibited Reinforced Concrete and the Non Slip Flag at the Glasgow Exhibition in 1887.

Silos, Concrete tanks a speciality.

Porous Drain Pipes quickly drain agricultural land. Moulds for same made up to 4 ft. 6 in. diameter.

Fence Posts, Building Blocks, Slabs and any other form of Concrete made to order.

Ex-Service men taught free of charge.

Model machines are used until proficient.

Building with Concrete blocks can be acquired within one month.

**The Cyclops Concrete Company,
HILBRE STREET, LIVERPOOL.**

Telephone: ROYAL 1195.

ESTABLISHED 1882.

Telegrams: ASSESSOR.

Sellers of Milk

Sell your milk to the best advantage. UNITED DAIRIES (WHOLESALE) LIMITED are always open to entertain offers of good dairies of milk delivered London on any line of Railway, or to any of their country Creameries. Collection arranged where necessary. A plentiful supply of churns provided and returned regularly. Prompt payments. Send particulars to United Dairies (Wholesale), Ltd., 34, Palace Court, Bayswater, London, W.2.

Buyers of Milk



**SEMI-ROTARY WING
LIFT and FORCE PUMPS**
for Water Carts, Farm and Estate
Work, and general purposes. All
sizes $\frac{1}{2}$ in. to 3 in. connection.

Willcox's

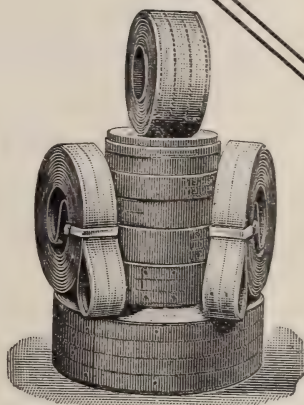


**LUBRICATING
OILS AND
GREASES.**

For all Types of
Engines and Machines.



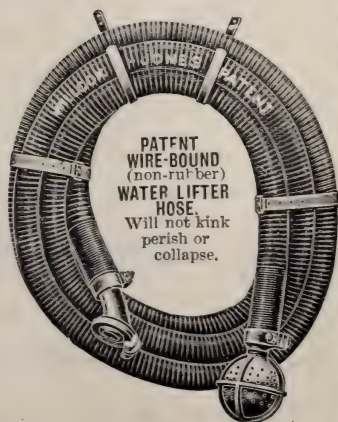
Specialities for Agricultural Engineers, Machinists, &c.



**Best English
Tanned
LEATHER
BELTING**
Hand-Sewn; also
Cotton, Hair and
'Balatite' (regis-
tered trade mark)
Balata Belting, &c.



"PENBERTHY" INJECTORS
Automatic (as illustrated), and Autoposi-
tive. For high pressures on Traction
Engines, &c.; **"MANZEL" AUTO-
MATIC OIL PUMP LUBRI-
CATORS**; **"JOINTITE"** High
Pressure Sheetting; Asbestos and India
Rubber Goods; Joints; Rings; and
Packings of every description.



**PATENT
WIRE-BOUND
(non-rubber)
WATER LIFTER
HOSE.**
Will not kink
perish or
collapse.

LET US QUOTE FOR YOUR
REQUIREMENTS.

W. H. WILLCOX & CO. Ltd.,
32-38, Southwark Street, London, S.E.1.

SLAG—— PHOSPHATE

Nauru Phosphate—Basic Slag.

Q The question of the value of **Ground Phosphates** is fully discussed in Prof. Hendrick's article, "**The Phosphate Industry**" which has been reprinted and may be obtained on application to the SLAG PHOSPHATE COMPANY, LTD.

Q The value of Ground **Nauru Phosphate**—the richest Phosphate known—is adequately and practically dealt with in **Leaflet 379** issued by the Ministry of Agriculture. In this leaflet the Ministry recommends the use of Slag Phosphate and Nauru Phosphate.

Q The conditions under which Nauru Phosphate and **Slag Phosphate** have become available are outlined in the form of question and answer in "**What are the Facts**"—a series of replies furnished by Mr. G. V. Parker, of the Slag Phosphate Company, in response to a request of the National Farmers' Union.

Enquiries for any of these publications may be sent to the—

Slag Phosphate Company, Limited,
NEWPORT (MON.),

London Office—38/39, Parliament Street, London, S.W.1,

Telephone: 5526 Victoria.

Telegrams: Slaguano Parl, London.

TO POULTRY FARMERS AND PRODUCE MERCHANTS :

British Substitutes for American Oyster Shell.

WHY BUY AMERICAN OYSTER SHELL for your Poultry, when there are excellent **BRITISH-MADE SUBSTITUTES** in the market at **LOWER PRICES ?**

If you buy **IMPORTED AMERICAN OYSTER SHELL**,

- (1) You pay more than home-manufactured substitutes cost,
- (2) You increase your country's indebtedness to the United States of America, and
- (3) You deprive some of your fellow citizens of employment.

If you buy **BRITISH-CRUSHED SHELL**, whether Oyster, Cockle or Oyster-Limpet,

- (1) You save money,
- (2) You help to stabilise your country's credit, and
- (3) You give employment to your British fellow citizens.

The Oyster-Limpet, or Slipper-Limpet (*Crepidula fornicata*), is a shellfish which was accidentally imported into English waters from America during the latter part of last century, and has increased so rapidly that it is now a serious pest on the oyster fisheries of certain districts.

These Limpets, which have to be removed from the oyster grounds if the latter are not to go out of cultivation, are manufactured at the Shell Crushing Factory at West Mersea, a little fishing village in Essex, into **AN EXCELLENT SUBSTITUTE FOR AMERICAN OYSTER SHELL**.

The shell of the Oyster-Limpet, like that of the Cockle and other molluscs, is composed of the same chemical substances as the Oyster shell; the only essential difference in the manufactured product, as sold, being the presence of a small quantity of flint grit, which cannot economically be separated, and which is itself of value as a digestive grit for poultry.

The shell is obtainable from agents in certain districts, and, in districts where no agents have been appointed, direct from The Shell Crushing Works of *The Ministry of Agriculture and Fisheries*, at the following prices, f.o.r. Colchester in 1 cwt. bags, for a minimum quantity of $\frac{1}{2}$ ton:

<i>Coarse and Medium Grades</i>	...	£5	0s.	0d.	per ton.
<i>Fine Grade</i>	... ..	£4	10s.	0d.	„ „

Smaller lots: 6s. per cwt. f.o.r., Colchester.

Letters should be directed to *The Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.*

Terms : CASH WITH ORDER.

Samples on application.

YOUR BIG OPPORTUNITY FOR PROFIT.

MANY FARMERS GO WITHOUT THE BEST WHEATS BECAUSE THEY THINK THEY CANNOT AFFORD THEM.

When YOU go to a sale, you do not hesitate to pay more for a cow that will give 8,000 lb. of milk yearly than for one that does not even pay for her keep. Mere lowness of price isn't everything. It is WHAT YOU GET FOR WHAT YOU PAY that counts.

If YOU want to realise, once and for always, that there is as much difference between highly-bred and improved Seed Wheat and the other kinds as there is between the 8,000-lb.-of-milk cow and the worn-out scrub, make a trial this autumn with

TOOGOOD'S SQUAREHEAD SUCCESS STIFF-STRAWED WHEAT, and Increase your Wheat Profits 40 to 60 per cent.

WRITE FOR FREE BOOK.

Get a FREE COPY of our BOOK OF "BETTER CROPS" SEED WHEATS, OATS, BARLEYS, RYES, &c., and just look into the matter for yourself—now—to-day. Free samples, too. All carefully bred, rogued, sound, graded, and cleaned clean. Grown on our cold hill-lands and chalky downs. Write to-day, addressing us personally.

TOOGOOD & SONS, LTD.,

Seedsman to H.M. THE KING, and Growers of "Better Crops" Seeds only,
SOUTHAMPTON.

**CHAS.
PAGE
& CO., LTD.,
47-51, King William St.,
LONDON, E.C.4.**

TELEGRAMS:

Inland: "Paganini, Cannon,
London."

Foreign: "Paganini, London."

N H₃

P₂ O₅

K₂ O

TELEPHONE:

Avenue 1729

(3 lines).

CONTENTS.

NOTES FOR THE MONTH	PAGE
<i>Conciliation Committees—An Agricultural Index Number—Fourth Meeting of the Agricultural Council for England—Late Claims under the Corn Production Acts—Weekly Return of Market Prices—Imperial Fruit Show—Egg and Day-old Chick Distribution Scheme, 1921—The Epizootic Abortion Order, 1921—Seeds Act, 1920</i> ...	577
THE AGRICULTURAL LABOURER IN THE EARLY 19TH CENTURY. <i>J. L. Hammond</i> ...	585
IMPROVEMENT OF DAIRY CATTLE IN DENMARK. <i>Harald Faber</i> ...	598
PIGS FOR PORK. <i>Sanders Spencer</i> ...	608
ROOTS v. SILAGE FOR DAIRY COWS. <i>A. W. Oldershaw, B.Sc., and F. C. Smith, B.A.</i> ...	614
HOME CURING OF BACON. <i>Mrs. C. E. Curtoys</i> ...	622
ROYAL COMMISSION ON IMPORTATION OF STORE CATTLE ...	626
INSECTICIDES AND FUNGICIDES ...	628
DORSETSHIRE ARTS AND CRAFTS, 1921. <i>Miss M. B. Mansel</i> ...	632
AGRICULTURAL STATISTICS: THEIR COLLECTION AND USE. <i>Sir Henry Rew, K.C.B.</i> ...	636
A FRUIT DEMONSTRATION STATION IN EAST SUSSEX. <i>A. H. Hoare</i> ...	645
THE STRAWBERRY CROP, 1921 ...	648
CONTROL OF "DAMPING OFF" AND "FOOT ROT" OF TOMATOES. <i>W. F. Bewley, D.Sc.</i> ...	653
PROTECTION AGAINST FUNGI FROM ABROAD. <i>Mrs. N. L. Alcock</i> ...	655
LICENSING STALLIONS UNDER THE HORSE BREEDING ACT, 1918. Season, 1921 ...	660
NOTES ON MANURES FOR OCTOBER. <i>E. J. Russell, D.Sc., F.R.S.</i> ...	664
NOTES ON FEEDING STUFFS FOR OCTOBER. <i>E. T. Halnan, M.A., Dip. Agric. (Cantab.)</i> ...	668
Leaflets issued by the Ministry ...	670
Rabies ...	671
Foot-and-Mouth Disease ...	671
Seed Potatoes from Scotland and Ireland ...	671
Importation of Plants ...	671
Importation of Rhododendrons ...	672

Any of the Articles in this Journal may be reproduced in any registered newspaper or public periodical without special permission, provided that the source is acknowledged in each case.

The Ministry does not accept responsibility for the views expressed and the statements made by contributors, nor for any statements made in the advertisement columns of this Journal.

BY ROYAL  WARRANT.

FISON'S

(IPSWICH)

FERTILIZERS

"The Best in the World."

**FOR ROOTS,
MANGOLDS,
SWEDES,
TURNIPS.**

Prompt Delivery, Perfect Condition,
Guaranteed Analysis.

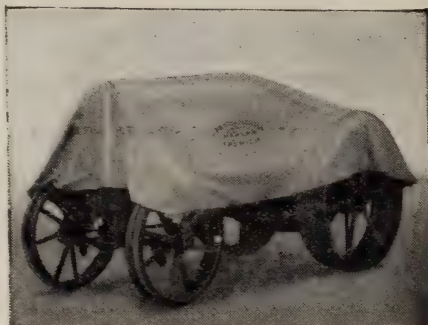
Full particulars and prices on application.

JOSEPH FISON & Co., Ltd,
IPSWICH.

PROTECT YOUR TRACTOR.

The most effective way is by using a

**ROTPROOF AND WATERPROOF
"CERES" COVER.**



	Size.	From.
To cover the FORDSON or CASE..	10 ft. x 8 ft.	£1 15 6
AUSTIN ..	11 ft. x 8 ft.	£1 19 0
INTERNATIONAL JUNIOR	12 ft. x 9 ft.	£2 8 0

Five per cent. Discount. Carriage paid on orders of 40/-.
**Covers made for any make of Tractor,
and for Wagons, Machines, etc.**

Write for samples to:

J. RANDS & JECKELL
DEPT. J. IPSWICH.

Manufacturers to H.M. the King.

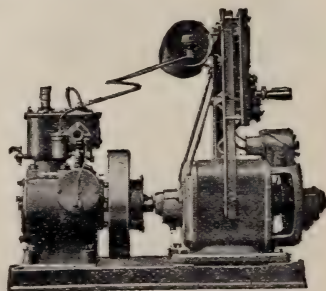
THE BRITISH



LIGHTING SET

500 CANDLE-POWER HOURS FOR A PENNY.

This is an authentic figure obtained with this reliable little plant at present-day prices. It is cheap to buy and cheap to run. It goes all day without attention and a maid can keep it in order. Give us particulars of the light or power you use and what it costs you. We will tell you candidly if you can save.



We deliver the set complete,
including battery.

AGRICULTURAL & GENERAL ENGINEERS, Ltd.,

Central House, Kingsway, London, W.C.2.

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XXVIII. No. 7.

OCTOBER, 1921.

NOTES FOR THE MONTH.

STEADY progress is being made by the Interim Conciliation Committees, which are being set up in England and Wales under the Corn Production Acts (Repeal) Act. With one or two exceptions the Committees have adopted their constitution, have decided whether or not to appoint an independent Chairman, and have considered those questions of procedure which must necessarily arise in the early stages of working.

Conciliation Committees in Agriculture.

The question of dividing the existing District Wages Committee areas into smaller areas and into sub-divisions has in some cases led to lengthy discussions, and many Committees have decided to dispose finally of this question before considering the question of wages and hours. In Yorkshire, three Committees have been agreed on; one for each of the Ridings. Separate Committees have been formed for Cambridgeshire and also for the Isle of Ely, but Huntingdonshire and Bedfordshire will continue as one Committee, at least for the time being. The Middlesex and Hertfordshire organisations have agreed that these counties shall no longer form a single area. Similarly, a separate Committee has been decided on for Rutlandshire, while for Leicestershire, which previously with Rutlandshire formed one area, a division into four areas has been agreed. A suggestion has also been made for a separate Committee for the Market Harborough area of Northamptonshire.

A constitution having been adopted, and the area question either disposed of or postponed for later consideration, many Committees have already been able to consider seriously what rates of wages should be recommended after the 1st October. Up to the 24th September, agreements as to wages after the 1st October had been recorded in four areas. The Cheshire and Surrey Committees have agreed that wages should continue payable at the rates left by the Wages Board until the 31st October, and the Denbigh and Flint Committee has

similarly agreed that the present rates should continue until the 5th November. The Staffordshire Committee has, however, decided on a new system by which wages are to be paid in future on an hourly basis, the agreement arrived at by the Committee being that for the period from the 1st October, 1921, to the 29th January, 1922, the minimum wage for adult able-bodied male workers should be at the rate of 9½d. per hour, and that a minimum of 50 hours per week be worked, leaving employers and workers to make mutual arrangements with regard to any further hours; Sunday work to be paid at the rate of 1s. per hour.

* * * * *

THE interest which has been aroused by the use made of the "Cost of Living" Index Number in recent discussions on wages

**An Agricultural
Index Number.**

has familiarised the public with the idea of an Index Number which expresses in a single figure the variations in the prices of a number of commodities. A figure of this kind which is of considerable interest to agriculturists has for some years past been prepared annually by the Ministry of Agriculture, and more recently this annual figure has been supplemented by a Monthly Number which aims at recording from month to month the changes in the prices of the principal articles which the farmer sells. These index numbers are based on the wholesale prices recorded week by week of agricultural produce, the average prices in the years 1911-13 being taken as a basis of comparison. The method of calculation remains the same throughout and therefore enables a fair comparison to be made of one year with another, but it is important to remember that the number merely represents the *average* increase or decrease which has taken place in a number of very different commodities, allowance being made as far as possible for the varying importance of the articles sold. Thus, as the sale of cattle is, on the whole, a more important item in the farmers' budget than the sale of wheat, greater allowance is made for changes in the former item than in the latter. The importance given to the different articles does not, however, vary from year to year, as that would destroy the value of the index number for purposes of comparison, and in practice the change which would be introduced by an attempt to adjust the weights to the total quantities produced has been found to be insignificant.

Taking the average prices during the basic years 1911-13 as 100, the average increase per cent. in each of the subsequent years has been found to be as follows:—

	Incr. per cent.		Incr. per cent.
1914	1	1918	132
1915	27	1919	158
1916	60	1920	192
1917	101		

These figures represent the average of the calendar years. It will be seen that, whilst in the first two years of the war the increase in agricultural prices was small, by 1917 prices had practically doubled; while in 1920, on the average they were 192 per cent. above those ruling in 1911-13. Although this was the average figure for the whole year, considerable reductions took place in certain articles during 1920, and these reductions, as is well known, have been continued and emphasised in 1921. To form an idea of current changes, it is necessary to have recourse to a monthly index number.

The monthly index number is more liable to error than the annual figure, owing to the fact that there are fluctuations in the quantities marketed from month to month, and seasonal variations in prices, which render the system of weights less satisfactory. By excluding certain commodities, such as hops, wool, fruit and vegetables, which are particularly subject to these variations, an approximate monthly index number is obtained which gives in broad outline the changes from month to month. Since the beginning of 1919 the figures have been as follows:—

Month.	Increase per cent. on the average of the years 1911-13.		
	1919.	1920.	1921.
January	148	213	186
February	150	205	172
March	150	199	158
April	153	199	141
May	132	169	112
June	128	164	102
July	141	174	100
August	138	177	116
September	148	181	—
October	166	191	—
November	182	197	—
December	207	194	—

During 1921, it will be seen that agricultural prices fell steadily from January to July. In January they were still on the average 186 per cent. above the 1911-13 level, in July they were only 100 per cent. higher—that is, approximately double the figures ruling during the three years before the War.

In August prices showed some recovery, due in part to the seasonal increase in milk prices which normally occurs in August

as compared with July, but more especially to the fact that an additional 3d. per gallon beyond the normal increase was paid more or less generally throughout August on account of the increased cost of milk production owing to the drought. Fat stock also showed a slight increase in value, but cereals, with the exception of barley, were cheaper during August than July.

* * * * * *

THE Council met on 17th August, 1921, at 11 a.m. in the Middlesex Guildhall, Westminster, S.W.1, the Earl of Selborne, K.G., G.C.M.G., being in the Chair.

**Fourth Meeting
of the Council of
Agriculture for
England.**

The proposed alteration of national agricultural policy as contemplated in the Corn Production Acts (Repeal) Bill was discussed, and in the course of the discussion

Lord Bledisloe gave notice of a motion for the next meeting of the Council in the following terms:—

“ That this Council desires respectfully to represent to His Majesty’s Government that constant, sudden and far-reaching changes in national agricultural policy are calculated both to restrict the production of the nation’s food, and to cause irretrievable injury to British Agriculture and to all classes of the agricultural community.”

Sir Douglas Newton gave notice of a resolution in the following terms:—

“ That in view of the sudden and drastic alteration made by the Government in their agricultural policy, they are hereby respectfully requested to make provision for advances on loan, in approved cases, of working capital to farmers who have recently purchased their holdings, on somewhat similar lines to those followed in the case of small holders.”

The Minister addressed the Council on the general question.

At a later stage in the discussion, Mr. C. P. Hall moved that “ This Council do now adjourn until this day month,” and he gave notice that he would then move that “ The Council do consider whether it has any further opportunities of useful service in view of the recent attitude to it of the Ministry of Agriculture.” Mr. Hall’s motion was seconded by Mr. J. V. Wheeler. The Chairman called attention to the fact that a motion that the debate, or Council, do now adjourn should be seconded without a speech, and put by him without debate. He suggested that the form of the resolution should be altered as follows: “ That this debate be now adjourned until an early date, when Mr. Hall

will move that the Council do consider whether it has any further opportunities of useful service, in view of the recent attitude to it of the Ministry of Agriculture." On a point of Order, Lord Bledisloe suggested that it might be possible under Standing Order 4 for a resolution to go forward from the Council as one of urgency, without waiting for another meeting. The Chairman replied that he would take the feeling of the Council as to whether the Standing Orders should be suspended under Standing Order 29, in which case three-fourths of those present and voting would have to vote in favour of the matter being one of urgency in order to carry the motion; he would not declare it to be one of urgency under Standing Order 4. The issue was put to the vote and the Chairman announced that the required proportion of votes was not reached. Mr. Hall's motion was then put and carried, and the debate accordingly adjourned.

Mr. W. Osborn moved:—

"That it is the duty of this Council to invite representatives of the Landlords, the Tenant Farmers, and the Agricultural Labourers to join in an attempt to frame an agreed agricultural policy."

Mr. Nunneley seconded the motion, which, after discussion, was, by leave, withdrawn.

The Report of the Proceedings of the Agricultural Advisory Committee for England and Wales, dated August, 1921, was received by the Council.

* * * * *

A NUMBER of farmers have failed to send their claims to the Ministry of Agriculture for payments in respect of wheat

**Late Claims
Under the Corn
Production Acts.**

and oats of the 1921 crop provided for by the recent Act of Parliament, or have sent them in later than 18th July, the last day fixed by Regulation. In order to avoid hardship in individual cases it has been decided to extend the date to 3rd October next.

The Ministry cannot undertake to make payments in respect of these late claims by 1st January next, but payment will be made as soon after as possible.

A claim form with an explanatory note has already been sent direct from the Ministry to all those persons who have filled in an Agricultural Schedule, but have not made a claim, and an acknowledgment has been sent to all those persons who had already made claims subsequent to 18th July.

* * * * *

SINCE 1904, the Ministry has published a Weekly Return of Market Prices summarising the trade in the various classes of

**Weekly Return of
Market Prices.**

agricultural produce and requisites at leading markets throughout the country. The Return includes a summary of the trade movements generally, with more detailed reports regarding certain selected markets, which are together representative of the trade of the country as a whole. Tables are included, showing in convenient form the average prices of the various commodities at each market week by week. The Return has hitherto been supplied to the public free, but, in view of the increased cost of printing and publishing, the Ministry has decided that after the end of this year it can be issued only to subscribers. The rate of subscription will be announced later. Farmers who do not already receive the Return may obtain a specimen copy on application to the Ministry.

* * * * *

AN article in the issue of this *Journal* for September, p. 540, gave an account of the Imperial Fruit Show to be held at the Crystal Palace from 28th October to 5th November. Schedules relating to the Commercial Section, the Amateur Section, the Cider Section, and the Overseas Section, have now been issued, and fruit growers throughout this country, and the other parts of the Empire where apples are grown are now busy selecting from the general bulk the show fruit for competition in the various classes.

**Imperial Fruit
Show.**

Present information indicates that nearly 40,000 cases of apples will be exhibited at the Crystal Palace, and of these some 5,000 or 6,000 are expected from Canada. Such a display of apples should have the effect of attracting to the Crystal Palace the general consuming public of London and adjoining centres.

The growers, and indeed the whole of the horticultural industry, now realise that a show of this importance provides a unique opportunity for further propaganda to interest the public in the use of apples, and so lead to a greater consumption, thus encouraging the industry to increase its acreage without the risk of the supply being in excess of the demand.

The Fédération of British Growers have in hand a project whereby samples of named varieties of apples will be supplied to the public, in order that they may become acquainted with the merits of the different varieties. The National Farmers'

Union hope to put up an attractive stand dealing especially with the apple crop, while members of the Union are co-operating to exhibit apples in the British Empire Class in the hope that the home-grown fruit may secure a premier place over the imported. The National Association of Retailers are providing prizes for an attractive Window Dressing Competition open to retailers throughout the United Kingdom. Show windows are to be dressed with apples during the week of the Imperial Fruit Show, and the prizes will be awarded by judging photographs of the windows. Such a competition should be very attractive to the retail trade, and of considerable importance in attracting the public to the show, and in increasing their interest in the apple.

It is understood that through the Wholesale Section of the trade arrangements have been made with a school of cookery for giving demonstrations in methods of cooking apples. The National Association of Cider Makers, in conjunction with the Cider Institute of Bristol, are installing plant and machinery, and demonstrations in cider making will be given every day throughout the show. The Ministry is arranging conferences, at which lectures will be given dealing with the various phases of fruit growing, and the value of the apple as an article of diet. Some lectures will be scientific, and some will be popular and of interest to the general public.

The question of grading and packing, which has lately come so largely before British growers and the general public, will be strongly represented, and the Ministry has arranged for continuous demonstrations. It is probable that three of the most expert packers from Canada will be available to assist the Ministry on this occasion.

A show conducted on these lines should guide growers to adopt the more approved methods of marketing; help those engaged in the horticultural industry by providing information as to the requirements of the growers; and increase the consumption of apples by the public.

* * * * *

PRELIMINARY figures of the distribution of sittings of eggs and day-old chicks under the Ministry's scheme during the 1921 season are now available. The object of the scheme is to provide small-holders, cottagers and others with stock of good quality at reasonable prices, and thus improve the utility value of the poultry stock kept by small occupiers throughout the country. The number of

**Egg and Day-old
Chick
Distribution
Scheme, 1921.**

eggs (to the nearest thousand) distributed in 1921 was over 104,000, being a slight decrease on the figures for 1920 (118,000) but an increase of nearly 100 per cent. over those for 1919 (53,000). The number of day-old chicks distributed was nearly 38,000, an increase of nearly 17,000 over the previous year and 35,000 above the figures for 1919. The total number of stations engaged in the work of distribution is now 256, showing an increase of 84 since last year and 93 more than in 1919. In 1921 the number of ducks' eggs distributed was nearly 1,500, as compared with less than 100 in 1920, when the distribution of ducks' eggs was included in the scheme. A beginning was made this year in distributing ducklings, over 200 being distributed by 28 stations. The scheme is administered by local authorities, and in view of the necessity for economy and the fluctuating prices during the season, the distribution during 1921 is regarded as quite satisfactory.

* * * * *

THE Ministry of Agriculture has issued an Order requiring that no cow or heifer which has calved prematurely shall be sold, exposed at a market fair-ground or sale-yard, or taken to a bull, within two months after such premature calving, except that a cow or heifer may be sold privately or taken to a bull within that time if notice in writing of the premature calving is given to the purchaser or bull-owner before the sale. If that notice is not given, or an animal is taken to market contrary to the provision mentioned, the owner or person in charge of the animal is liable to prosecution under the Order. A further clause of the Order requires that no such animal shall be turned out on any common or unenclosed land or in a field or other place insufficiently fenced. The Order applies to the whole of Great Britain and comes into operation on 1st October, 1921.

**The Epizootic
Abortion Order,
1921.**

The position in regard to this matter is that on 19th January, 1920, the Ministry made an Order enabling Local Authorities to make regulations prohibiting the exposure in a market, or the private sale without notification of premature calving, of any cow or heifer coming within the category mentioned. Most Local Authorities made regulations, and some of those which did not, gave it as their reason that regulations would be of little use unless they were general throughout the country. The Ministry has also received representations from several of the chief Associations and Unions of Farmers in the country, as well as from

many Local Authorities, urging that the Order should be made general and compulsory. The Minister has now taken this step after consultation with his Agricultural Advisory Committee.

It should be mentioned that a successful method of immunising cows and heifers against the disease by vaccination has been elaborated at the Ministry's Veterinary Laboratory. Over 20,000 animals were vaccinated in 1920 in Great Britain.

The vaccine can be obtained by applying to the Chief Veterinary Officer, Laboratory of the Ministry of Agriculture and Fisheries, New Haw, Weybridge, Surrey.

* * * * *

UNDER the Seeds Act, 1920, it is necessary in the case of a sale of any of the principal kinds of farm and garden seeds for

**Seeds Act, 1920:
Special Require-
ments in the Case
of Sales of
Cereal Seeds.**

a statement giving certain specified particulars with regard to the quality of the seeds sold, to be delivered to the purchaser at or before the time of sale or delivery. In the case of cereal seeds, however, it has been found that supplies of new seed are required so urgently for autumn sowing that serious inconvenience is suffered by the delay caused in having the necessary test carried out before delivery is effected. The Ministry has therefore issued a general licence authorising the sale of cereal seeds in England and Wales up to the 30th November of the year in which the seed is harvested, without declaring the particulars required under the Seeds Act at or before the time of sale or delivery, provided that such particulars are declared in writing to the purchaser either in an invoice of the seeds, or in some other form, within one calendar month of the sale.*

The particulars required to be stated in the case of a sale of cereal seed are the name and address of the seller; that the seeds have been tested in accordance with the Seeds Act, 1920; the distinctive name of the variety, or if the distinctive name of the variety is not known, or the stock is mixed, a statement to that effect; and the percentage of germination, provided that if the percentage of germination is not less than the authorised minimum in each case, viz., Wheat, 90 per cent., Barley 90 per cent., Oats 85 per cent., Rye 80 per cent., a statement to that effect, which shall include the authorised minimum percentage of germination, shall be sufficient.

* Copies of the Seeds Act, 1920, and of the Seed Regulations, 1921, may be obtained from H.M. Stationery Office, Imperial House, Kingsway, W.C.2 (price 2d. and 3d. net each respectively).

THE AGRICULTURAL LABOURER IN THE EARLY 19TH CENTURY.

J. L. HAMMOND.

IN the Middle Ages England as a rural society differed little from the other parts of western Europe. The unit of government was the manor. The origin of the manor is the topic of some of the most famous of the controversies of scholars and historians. With those discussions we need not trouble ourselves; it is sufficient for our purposes to note that the men and women living in the villages contained in the manor had certain duties and certain rights. They had to perform certain services in return for which they enjoyed a certain status. Nothing is more important or more interesting in the history of the different nations of Europe than the circumstances under which this ancient society was dissolved. Why, and under what conditions did the peasant survive in certain countries, and why, and under what conditions did he disappear in others? The most illuminating discussion of these historical changes is to be found in the address that Professor Ashley gave to the International Congress of Historical Studies a few years ago. He showed in that address how closely related are these social changes to the type and form of government which was in existence at the time.

France and England.—The contrast can be put most effectively by noting the difference between France and England. In France in the eighteenth century the bulk of the French peasants were customary tenants of one kind or another. They retained a number of obligations from the old feudal system, but subject to these services they held the land they cultivated with some degree of independence. The noble was a courtier rarely living on his estate, and the actual government of the district was in the hands of an official of the Crown known as the *intendant*. The Revolution had two consequences of great importance to the peasant. First and chief it released him with a stroke of the pen from all dues and services that he owed to his lord. That is, he became the unqualified owner of his holding. He was no longer obliged to carry his corn to the lord's mill to be ground, or to pay all kinds of tribute on all kinds of occasion. Further, though rich men bought a great deal of the land that was confiscated when the Church and the emigrant noblemen were dispossessed, a certain amount of that land came into his hands.

If we turn to England we find that the old village was dissolved in a very different manner. The agrarian revolution which began with the conclusion of the 16th century and was in full force between the middle of the eighteenth and the middle of the nineteenth centuries destroyed the village as a society of men with common rights, changing the population from men with rights and property of one kind or another into landless wage earners. Before that revolution, over most of rural England the normal inhabitant of the English village had certain common rights. In many cases he owned a strip of the common fields; in most he had the right to common pasture. At the time at which this society was taken to pieces the government of England was in the hands of an aristocracy which, unlike the French aristocracy, lived on the land, and took an active part in local government. To this class it seemed obvious that the whole system of agricultural life, of which this common field farming was a part, was retrograde. It believed that the agricultural labourer would be more effective than the peasant, that the possession of rights and some degree of independence discouraged men and women from putting forth their best energies, and that the real stimulus to industry was the pressure of poverty. A writer at the time put this view very well when he said that the use of common land by labourers operates upon the mind as a sort of independence, and that among the advantages that would follow the enclosing of the common "the labourers will work every day in the year, their children will be put out to labour early, and the subordination of the lower ranks of society, which in the present time is so much wanted, will be thereby considerably secured."

Enclosures.—With these ideas in the ascendant it was not likely that the rights either of the individual peasant or of the village as a peasant society would be carefully protected in the process of enclosure, or the process by which the individualist farming was substituted for the old confused economy. In truth they were almost wholly disregarded. When an enclosure was carried out by Act of Parliament the procedure was by private Bill. Commissioners were appointed to inquire into local rights and to make the enclosure award. Only two interests were formally and definitely protected in the Bill: the interest of the lord of the manor, and the interest of the owner of the tithe. The individual proprietor and the individual commoner had to make out his case as best he could, and when he received compensation it was often in the form of a small plot of land, unaccompanied by rights of pasture on the common, which he

could only sell because he could not afford the expense of fencing. Of course in hundreds of cases a small commoner could not make out a case at all. He was uneducated and about his rights he knew little, except that as long as he could remember he had kept a cow, driven geese across the waste, pulled his fuel out of the brush-wood and cut turf from the common, and that his father had done all these things before him. It followed, therefore, that in nine cases out of ten on an enclosure the peasant vanished, and the inhabitants of the village became wage earners and nothing more. Thus, when the mediæval village disappeared in France, the various Frenchmen who were called peasants became landowners, where in England they became wage earners.

England and France thus present examples of the dissolution of the old village society under the influence in the one case of aristocratic and in the other case of revolutionary ideas. We might find another contrast in the histories of Prussia and Bavaria. It was thought until lately that Stein and Hardenberg did for the peasant in Prussia what the French Revolution did for the peasant in France. Professor Ashley shows that this view was mistaken. The Prussian peasant was enfranchised on much harsher terms, for the peasants had to surrender from one-third to a half of their holdings to compensate their lords for the loss of their labour services. This operation was carried out at a time when the landlord class was very powerful in Prussia. In Bavaria, on the other hand, the abolition of serfdom and the dissolution of the old system took place in the middle of the last century, and as half the duchy had been in the hands of ecclesiastical bodies down to the nineteenth century, there was not a powerful landlord class, and the peasants were consequently enfranchised on much easier terms.

We may put it broadly then that England got rid of serfdom earlier than the Continent, but that the general conditions on which the mediæval village was finally re-arranged were prescribed by an all-powerful landlord class. This, as Professor Ashley has pointed out, had very important consequences. It is true of almost every society down to the eighteenth century that there were reasons of state for preserving the peasantry and reasons of class interest for dissolving it. Mr. Tawney's brilliant book on "The Agrarian Problem in the Sixteenth Century" shows these motives in conflict in the struggles over the enclosures of that age. The interests of peace, defence, order, and revenue all demanded in the eyes of prominent statesmen at that time (as they demanded in the eyes of a continental ruler like Marie Thérèse or Frederick William the Third of

Prussia) that the peasantry should not be torn from the soil; the commercial interests of a powerful class pulled in the contrary direction. At the time of the 18th century agrarian revolution in England there was no such conscious conflict. The landlord class which controlled the Government saw no antithesis between the reasons of state and the reasons of class interest. In their minds public policy and private interest pointed the same way. Their power was absolute and they used it to destroy a village society which seemed to them barbarous and obsolete. The ideal village in their view was not a society linked together by a system of common rights, but a society in which the squire was supreme, the greatest encouragement was given to the application of capital to farming, and the actual tilling of the soil was carried out by a proletariat.

Sir John Sinclair, first President of the Board of Agriculture of that time, said what most enlightened people thought: "The idea of having lands in common, it has been justly remarked, is to be derived from that barbarous state of society, when men were stranger to any higher occupation than those of hunters or shepherds, or had only just tasted the advantages to be reaped from the cultivation of the earth." And almost every enlightened person would have agreed that the worst thing to do in reforming this barbarous system would be to turn the man who worked on the soil into an owner. McCulloch, the celebrated economist, predicted that in half a century France would pay for her blunder in this respect by finding herself "the greatest pauper warren in Europe."

There was a sense, of course, in which it was quite true that the interests of the class in power were identical with the interests of the nation. Lord Ernle has shown in his judicial survey of the problem in his classical history "English Farming Past and Present," that the old common field system, as it was conducted, could not have met the growing and urgent needs of the English people. The French War and the industrial revolution, coming together, changed the balance and problem of English economic life. There was the pressure of a great emergency, throwing England on her own resources: there was the rapid increase of population in industrial towns that produced no food. England had to make her soil more productive or starve. This need accelerated the process of enclosure. If this problem had not arisen England might have remained for another generation the kind of society for which Dean Inge cherishes such regrets, as readers of his book, "Outspoken Essays," will remember, and the extinction of the old village

society would have been a slower process. Reform was essential, not merely for the sake of the future, for reform of that kind is commonly neglected till the crisis comes, but for the immediate wants of the moment. And reform is difficult in peasant societies where men look to the past more than to the future, and honour custom more than science, piety more than enterprise.

Leadership of Landlords.—It was true also that the leadership the landlords claimed was justified as a rule by their services. Not only were they, in contrast to the French aristocrats, men of great public spirit, who served their counties and their villages with devotion and industry: they were in notable instances the pioneers of the great improvements that marked this phase of English agriculture. It would be difficult to name a Cabinet Minister of the time, Pitt and Fox excepted, who counted for so much in the life of the England of that time as Coke of Norfolk. Here was an opportunity and the men to seize it, a crisis and the men to meet it. One reason why enclosure bills went through Parliament with so little scrutiny was that the advantage of putting agriculture under the direction of men with capital, knowledge and foresight and of removing every obstacle to their exertions were so self-evident that the details seemed to possess in comparison very trifling importance. One speaker put it in the House of Commons that he supported every enclosure bill as a matter of course because enclosures could not be too rapid or too sweeping.

Evils of the Revolution.—Unfortunately the social evils of this revolution were not less striking than the economic advantages. For the enclosures carried out in this spirit, with or without an Act of Parliament, spelt ruin to the poorer classes who took part either as small farmers or as cottagers and labourers in the economy of the old village. The great majority received nothing under the enclosure awards: those who did receive an allotment could not as a rule put it to any use either because they could not afford to fence it or because it was valueless without a right of pasture on the common. Of the men who were dispossessed some emigrated to America and some to the new industrial towns, where they supplied the new industrial system with enterprise or with labour. Some of the chief names in the history of the cotton industry, Peel and Fielden among them, take us back to an enclosure. But the great majority remained in their villages, sinking into the position of a labourer without rights. The great bulk of agricultural work was now carried on for the first time by men without any rights on the soil. Few of the enthusiasts for enclosure foresaw all the

consequences of this momentous change or realised that some provision must be made for it. As it happened, the event that forced this problem on the public mind was the event that had accelerated enclosure. The French War brought recurring spells of scarcity and famine prices, and during the French War the harvests were as a rule poor; in particular they were disastrously bad in the years 1795, 1799 and 1800.

Degradation of English Life by Doles from the Rates.—The year 1795 therefore marked an important crisis. The labourer had raised a good part of his own food under the old system and he had never been dependent entirely on his wages. He had now lost his cow, his geese, his fuel, and he had to rely on his wages, buying at the shop or from a farmer who was not always anxious for his custom, the food he had formerly produced himself. Thus scarcity and high prices hit him much harder than they would have hit him under the old system. By 1795 his wages no longer supported him. Something had to be done unless he was to starve. Some observers argued that the right policy was to set up a minimum wage. Arthur Young was himself in favour of this plan and it was supported by two clergymen who had great knowledge of the state of the villages and great and wise sympathy with the unfortunate labourers. One was Howlett, the Vicar of Dunmow, and the other Davies, the Rector of Barkham in Berkshire, the author of a singularly interesting and illuminating book called "The Labourer in Husbandry." The proposal was taken up by Whitbread in Parliament, and it had the support of Fox and Grey, but it was rejected at the instance of Pitt who denounced it as economically unsound. The plan adopted in its stead is famous in history as one of the capital causes of the degradation of English life in the first thirty years of the nineteenth century.

This method takes its name from Speenhamland, now part of Newbury, where a meeting of Berkshire magistrates was held at the Pelican Inn, on 6th May, 1795, to consider the problem. The Chairman of the meeting, Charles Dundas, the Member for Berkshire; afterwards Lord Amesbury, who was in the chair, was in favour of using the power given to the magistrates by the Act of Elizabeth to fix wages, but he was defeated and the meeting decided instead to adopt a scheme for supplementing wages from the rates on the plan that soon spread to other counties. The resolution that was passed may be given:—

"Resolved, that it is not expedient for the magistrates to grant that assistance by regulating the wages of day labourers according to the directions of the Statutes of the 5th Elizabeth and 1st James: But the

Magistrates very earnestly recommend to the Farmers and others throughout the county to increase the Pay of their Labourers in proportion to the present Price of Provisions : and agreeably thereto the Magistrates now present have unanimously Resolved, that they will in their several Divisions, make the following calculations and allowances for the relief of all poor and industrious men and their families, who, to the satisfaction of the Justices of their parish, shall endeavour (as far as they can) for their own support and maintenance, that is to say, when the gallon loaf of second flour, weighing 8 lbs. 11oz. shall cost one shilling, then every poor and industrious man shall have for his own support 3/- weekly either produced by his own or his family's labour or an allowance from the poor rates, and for the support of his wife and every other of his family 1/6. When the gallon loaf shall cost 1/4 then every poor and industrious man shall have 4/- weekly for his own and 1/10 for the support of every other of his family. And so in proportion as the price of bread rises or falls (that is to say) 3d. to the man and 1d. to every other of the family on every penny which the loaf rises above a shilling."

On the same day the Mayor of Basingstoke presided over a meeting in that town at which a resolution was adopted in favour of fixing wages rather than making doles on this principle from the rates, but it was the dole system that won in the country and by 1834 it was in force everywhere in England except in the two counties of Durham and Northumberland.

The Poor Law of 1834.—The dole system lasted till 1834 when it was abolished by the new Poor Law. By that time it was generally condemned on the sufficient grounds that it was bringing the parishes to bankruptcy and the labourers to hopeless improvidence. The Report of the Commissioners on the Poor Laws gave several examples of the first of these results. The expenditure in Slaugham with a population of 740 was £1,706. "This large sum was spent principally in orders on the village shop for flour, clothes, butter, &c. The tradesmen serve the office of overseer by turns : the two last could neither read nor write." The effect of the system in destroying all motives for thrift in the labourer was obvious, for it meant in practice that only men who were qualified to receive relief as paupers were eligible for employment. A witness before the Poor Law Commission of 1834 told the following story:—

"The case of a man who has worked for me will show the effect of the parish system in preventing frugal habits. This is a hard working industrious man named William Williams. He is married and had saved some money to the amount of about £70, and had two cows : he had also a sow and ten pigs. He had got a cottage well furnished : he was a member of a benefit club at Meopham, from which he received 8s. a week when he was ill. He was beginning to learn to read and write and sent his children to the Sunday school. He had a legacy of about £46 but he

got his other money together by saving from his fair wages as a waggoner. Some circumstances occurred which obliged me to part with him. The consequence of this labouring man having been frugal and saved money, and got cows, was that no one would employ him, although his superior character as a workman was well known in the parish. He told me at the time I was obliged to part with him : ' Whilst I have these things I shall get no work : I must part with them all : I must be reduced to beggary before anyone will employ me.' I was compelled to part with him last Michaelmas : he has not yet got work, and he has no chance of getting any until he has become a pauper : for until then the paupers will be preferred to him."

A man who had any property, if it was savings or a cottage or a few animals, could not receive help from the rates : a man who did not receive help from the rates could not get any farmer to employ him. The Poor Law designed to help had become a vicious circle from which the poor man could find no escape.

The Roundsman System.—In the old village there had been a number of persons who were partly farmers and partly labourers. There were again a number of labourers who when employment was scarce could find work to occupy themselves, in collecting fuel, cutting turf and looking after their live stock. A good many observers, reflecting on the great stimulus that might be given to agriculture by organisation, concentration, and the proper division of labour had regarded this kind of dual life as a great obstacle. Under the Speenhamland system the labourer was deprived not merely of these aids to independence but of any power to bargain for himself about his labour. He had to take any wage that the farmer chose to give him and to receive the rest of his subsistence from the parish in a form that made him a kind of serf. An Act of Parliament known as Gilbert's Act, passed in 1782, had introduced a system, called "the roundsman system," by which the parish distributed unemployed labourers among the parishioners, the parish paying two-thirds of their wages, and the employer one-third. By the Speenhamland system every labourer became a pauper in the sense that his wages were eked out by a dole from the rates.

If a labourer was in private employment, the difference between the wage his master chose to give him and the recognised minimum was made up by the parish. Those labourers who could not find employment were shared out among the ratepayers or else their labour was sold to employers by the parish at a low rate, the parish contributing what was needed to bring the labourers' receipts up to scale. The roundsman system has been described by Crabbe :—

“ Alternate masters now their slave command
Urge the weak efforts of his feeble hand,
And when his age attempts its task in vain,
With ruthless taunts, of lazy poor complain.”

Under this plan the depression of wages was inevitable. During the war the plan seemed to work because prices were high, farming was exceedingly profitable and unemployment not very general. After the peace came, however, it was no longer possible to absorb the redundant labour, with a population increasing rapidly, in this wasteful roundsman system. In Buckinghamshire in 1828 wages were 3s. a week for single and 6s. a week for married men, and witnesses from different parts of the country gave the same accounts of wages that were far below subsistence level. The only exceptions were the counties in the North where the Speenhamland method had not been applied. The strain on the parish system became acute and it was met by reducing the subsistence scale. In a report of the old Board of Agriculture we have an account of the scale fixed in Northamptonshire in 1816 and it shows a decline from the scale fixed at Speenhamland in 1795. We have another scale in the Report of the Committee on the Poor Laws which shows that in Wiltshire in 1817 a man was allowed little more than half of the allowance of 1795. In Hampshire and in Dorset scales were fixed in 1822 and 1826 that mark a further drop, and in his “ Political Economy,” published in 1825, McCulloch says. “ The allowance scales now issued from time to time by the magistrates are usually framed on the principle that every labourer should have a gallon loaf of standard wheaten bread weekly for every member of his family and one over: that is four loaves for three persons, five for four, six for five and so on.” Thus we see that the standard of subsistence had fallen by fifty per cent. between 1795 and 1825, or we may say that a man and his wife in 1825 were allowed only as much as a single man in 1795. That of itself would be sufficient evidence of the deterioration in the circumstances and prospects of the labourer. Yet, to understand fully his bitterness we must recollect that the labourers who were now sent on their roundsman job or, as in some cases, put up to auction in the parishes, had often known what it was to be independent men living not altogether on wages but on their own resources as small farmers or cottagers with common rights, and that almost all of them inherited the traditions of such a life.

The Game Laws.—There was not a uniform administration of this system and the practice varied in different districts. In

many cases, only the wages received during the last week or fortnight were taken into account, and thus the allowance would be paid sometimes to persons who were not in need. This accounts for the fact stated by Thorold Rogers that there were labourers who actually saved money under this system, but generally speaking it was true that it was impossible to maintain life on the allowance fixed in the years after the war. In this extremity the labourers kept themselves and their families by poaching. At no time since the old forest laws were passed by the first Norman Kings has poaching been so important an element in English life as it was in the first thirty years of the nineteenth century. One witness before the Committee on the Game Laws said that in a village of which he knew the whole village poached, the constable included. The Duke of Richmond stated in the House of Commons that one in seven of the criminal convictions of the country in the years 1827-1830 were convictions under the Game Laws. The number of persons so convicted was 8,502, many of them being under eighteen. Cobbett tells us that a gentleman in Surrey asked a young man who was cracking stones on the road side, how he could live on half a crown a week. "I don't live on it," he said. "How do you live then?" "Why," said he, "I poach: it is better to be hanged than to be starved to death."

The Visiting Justices of the Prisons in Bedfordshire reported in 1827 that more than one-third of the commitments during the last quarter in that county had been commitments for offences against the Game Laws. "In many parishes in this county the wages given to young unmarried agricultural labourers, in the full strength and vigour of life, seldom exceed 3s. or 3s. 6d. a week, paid to them generally under the description of roundsmen, by the overseers out of the poor rates: and often in the immediate vicinity of the dwellings of such half-starved labourers there are abundantly stocked preserves of game, in which, during a single night, these dissatisfied young men can obtain a rich booty by snaring hares or taking or killing pheasants." It was in consequence of the steady increase of poaching amid the great distress of the time that the Game Laws were made more and more drastic until our code became in some respects the most severe in Europe.

Schemes for Improvement of the Conditions of Labour.—It must not be supposed that the governing class was indifferent to all this wretchedness and poverty. The speeches of landowners in both Houses of Parliament are full of laments about

it. Karl Marx, a bitter critic of the England of those times, admitted that there was one respect in which England set a good example: she was continually holding inquiries and publishing facts about her social problems. At this time there were frequent investigations into the Poor Laws and the Game Laws, and Parliamentary committees were constantly trying to find out what was the matter. The truth was that under the influence of a great economic stimulus and a great national danger Parliament had carried out a revolution which had had beneficent consequences in increasing the food resources of the country at a time when that increase was urgently needed, and it was quite helpless in the face of these unexpected results. This sudden and perplexing social problem bewildered most people. In the back of their minds they believed it insoluble.

Remedies were suggested by men of experience and knowledge. Such were Eden, Arthur Young, Cobbett, and Lord Suffield, all of whom at different times proposed schemes for providing labourers with cottages and allotments. All these schemes assumed, in opposition to the general notion of the time, that independence was not a bad but a good influence in a man's life: acting as a spur to his industry and thrift. Arthur Young proposed that twenty millions should be spent in endowing half a million families with cottages and allotments: the fee simple to be vested in the parish, the cottage and land to revert to the parish if the father or his family became chargeable to the rates. The proposal was made at a time when a General Bill for facilitating and cheapening enclosure was before Parliament. Young made the proposal because in his travels about the country he had been appalled by the general avalanche of pauperism under which the villages were sinking, and he noticed that wherever there were cottagers who had kept together a little property or retained their rights of pasture they had escaped the common fate. His pamphlet is a moving document, showing how painful an impression the scenes he had witnessed had made on his mind. He was supported by Sir John Sinclair, the first President of the old Board of Agriculture, but the Board was now in other hands and though Young was Secretary the publication was private and not official. It was Young's hope that the General Enclosure Bill, then before Parliament, would be amended in order to make provision for cottagers in future enclosures, but his hope was disappointed. Cobbett sketched a similar plan in a letter to William Windham, published in his *Political Register*; and Lord Suffield, well known for his noble exertions as a Prison Reformer, tried in vain to get Lord Grey's Govern-

ment to adopt this policy in 1831 after the riots of the winter of 1830 and their terrible punishment. Up and down the country there were individual landowners and individual parsons who managed to introduce schemes of this kind into enclosure Bills or into the administration of particular estates, generally with most satisfactory results, but the general opinion in enlightened circles was unfavourable.

For the teaching of Malthus was in fashion and most people argued that any reform of this kind would stimulate the increase of population in which they saw at once the great mischief and the great danger of their age. The drastic surgery of the Poor Law of 1834, described by Thorold Rogers as "necessary, inopportune and unjust," represented the views of the majority of the time; the school known as the "Vice and Misery" school because it held that it was only by these terrible agents that Nature prevents man from increasing faster than his food. A powerful attack was made on that creed by Michael Sadler, the Tory Member for Newark, chiefly known as the leader of factory reform, in the House of Commons in 1831, in a speech that contains a most interesting review of the agricultural conditions of the time.

A monumental volume has lately been published by a Cambridge scholar describing the different types of agricultural society that are to be found in the records of classical literature. Mr. Heitland traces in this book "*Agricola*" the development of Latin farming through its different phases. We see the small farmer, the man who fought the early wars of the republic, working with a small staff of domestic slaves. He gives way to the great capitalist farmer who employs the slaves that were swept into Italy from all the populations that were conquered by Roman arms. These unhappy exiles lived in "*ergastula*" and we think of them chiefly in connection with the exploits of Spartacus, the Thracian, who led his fellow slaves to a short-lived victory over Roman armies. Then there comes a check to this process because the slave supply from this source declines under the Empire and the work of cultivation is done by Roman coloni, tenant farmers. As their embarrassments and difficulties grow, these men lose their status and sink to the position of serfs. Thus in all ages we are confronted with this same problem, of finding under what type of human society agriculture can best serve her two great purposes, as the source of food and the mother of men. In that tormenting tragedy the history of the English labourer in the years that followed the great struggle with Napoleon makes a significant episode.

IMPROVEMENT OF DAIRY CATTLE IN DENMARK.

HARALD FABER,

Agricultural Commissioner to the Danish Government.

IN the year 1920 the Danish Milk Recording Societies celebrated their 25th anniversary, the first Society, at Vejen, Jutland, having started operations in 1895. The Associated Danish Agricultural Societies marked this jubilee by publishing a report containing a series of articles describing the various features of the development during these 25 years. One of the articles, by Johs. Petersen-Dalum, the son and now the successor of the founder and director of the Dalum Agricultural and Dairy School, deals with the Influence of Milk Recording on the Breeding of Dairy Cattle. The following remarks are based chiefly on that article and on a paper read in January, 1919, by Peter Aug. Mørkeberg (Live Stock Commissioner to the Danish Government) on "The Cattle Breeding Societies in Funen during 25 years." I am also indebted to Mr. Mørkeberg for various hints and additional information.

The aims of the first Society, "Vejen Kontrolforening,"* were to ascertain the quantity and quality (percentage of milk fat) of the milk yield of individual cows, the amount of fodder consumed, and the relation between yield of milk and consumption of fodder. The sphere of action of the Danish Milk Recording Societies have since been stated to be:—

1. The Societies ascertain the yield of milk and of butter and the increase in live weight obtained from 100 food units;
2. They estimate the value of the animal as a producer and offer the chief guide when selecting animals for breeding;
3. They induce farmers to keep accounts of farming;
4. All branches of farming should gradually be included in the operation of the Societies;
5. The Record-keeping is done in the cheapest manner by forming special Societies for the purpose.

The first object of milk recording, the importance of which should be readily understood by all dairy farmers, is to discover those cows in the herd which produce too little milk and butter

*The reason why Danish Milk Recording Societies are called "Control Societies" is given on page 110 in my book, "Co-operation in Danish Agriculture," 1918: Longmans, Green & Co.

to pay for the fodder consumed and which are therefore kept at a distinct loss to the farmer and to the country. When the Vejen Society had been working for one year a report was published in which it was shown that the best cow belonging to members of the Society produced a pound of butter at the cost of 6d., while the poorest cow produced a pound at the cost of 2s. 8d.! Cows like the latter should, of course, be fattened off and killed as soon as possible.

Of even greater importance, however, is the help or guidance which the results of milk recording offer the farmer in his efforts to breed dairy cattle for milk production. This was seen clearly by the men who started the movement in 1895; indeed, the desire to obtain reliable information on which to base the breeding of cows with a large yield of rich milk was the chief reason which induced the farmers to form the Vejen Society. By 25 years' work the milk recording societies have gradually secured a hitherto unknown reliability in the breeding of dairy cattle. By recording the yield of milk and butter the farmer would learn not only which cows should be got rid of, but which were the "butter cows," cows yielding a large amount of milk and butter fat, and these he would use preferably to breed from. In the by-laws of many of the Danish Control Societies, or Milk Recording Societies, the principal aim is stated to be "based on records of the yields of milk as to quantity and quality, and of the fodder consumed, to determine whether the keeping of dairy cattle yields a profit, and to help to form strains of dairy cattle producing an increased yield of butter." The Danish Government has in various ways helped cattle breeding by grants. By the Law of 1902 on Breeding of Domestic Animals the Government granted £6,700 to the Milk Recording Societies on condition that "the Society should have for its aim to make dairy farming more profitable by examining into the feeding of the individual cows and their yield of milk by quantity and quality, and to help to form strains of dairy cattle producing a higher yield of butter." The grant was renewed by the Law of 1912, which reduced or withdrew most other grants to cattle breeding. The milk recording society should have at least 10 members with 200 cows, and the grant to each society was not to exceed £10.

When Danish farmers, in the 'seventies and 'eighties of last century, gradually learned to appreciate the importance of dairy farming they tried to improve the yield by better feeding and better selection of animals for breeding. The means of judging the cattle, at shows and at home, were restricted to a considera-

tion of their exterior, their build, so-called milk sign, such as size of udder, Guenon's mirror and so on. Only a few prominent breeders knew anything about the *yield* of milk of their cows, none knew about the *richness* of the milk. Breeders suffered not only from the uncertainty in the valuation of the individual cow as a milk producer, but they were also uncertain as to the ability of the cow to transmit her character as a milk producer to her progeny. Even more difficult was the selection of the male animal with a view to improved yield of milk.

The milk recording societies brought about a change by enabling the best productive cows to be picked out. The study of the milk records was bound to cause an increase in the average production, by eliminating the bad milkers and by breeding from the good milkers. Concurrently a more liberal feeding was adopted, the fodder being apportioned between the cows in proportion to their yields. Because of the influence of the better feeding it is impossible to say exactly what was the influence to be ascribed to the milk recording societies, but the influence of the general improvement in methods of breeding and rearing of dairy cattle is easily perceptible. Take, for example, the figures in the following table calculated from the records of the milk recording societies in Funen. In 1909 the total number of cows and of heifers which had calved in the island of Funen was 153,500. The following average figures are calculated from the *records of all cows* belonging to members of the milk recording societies, whether in milk or not, whether in calf or not:—

<i>Year.</i>	<i>Number of cows.</i>	<i>Yield of milk.</i>	<i>Percentage of fat.</i>	<i>Yield of butter.</i>
1899-1900	5,467	6,822	3.36	255
1902-03	17,662	7,410	3.41	282
1905-06	33,903	7,240	3.47	279
1908-09	40,788	7,473	3.49	290
1911-12	30,757	7,667	3.52	301
1913-14	41,591	7,832	3.52	308
1915-16	40,116	7,938	3.55	323

Similar results were obtained in other districts, but showing a slightly smaller increase than for the societies of Funen. In judging these figures it should be borne in mind that for the different years they refer to different animals, and particularly that every year there are included new herds which have not been previously tested. The progress in individual societies, and still more in individual herds, is often very much greater.

Family Herdbooks.—It is the general rule in Danish dairy farming that the farmer breeds his own cattle. He will select



FIG. 1.—Bull of Red Danish Dairy Breed, "Dan" (Herdbook 450).

Owner: Grut Hansen, Kolkolle.

27 Daughters of "Dan" yielded on an average during the year 1912-1913
11,235 lb. of Milk, 3.89 per cent. of Fat, 488 lb. of Butter.

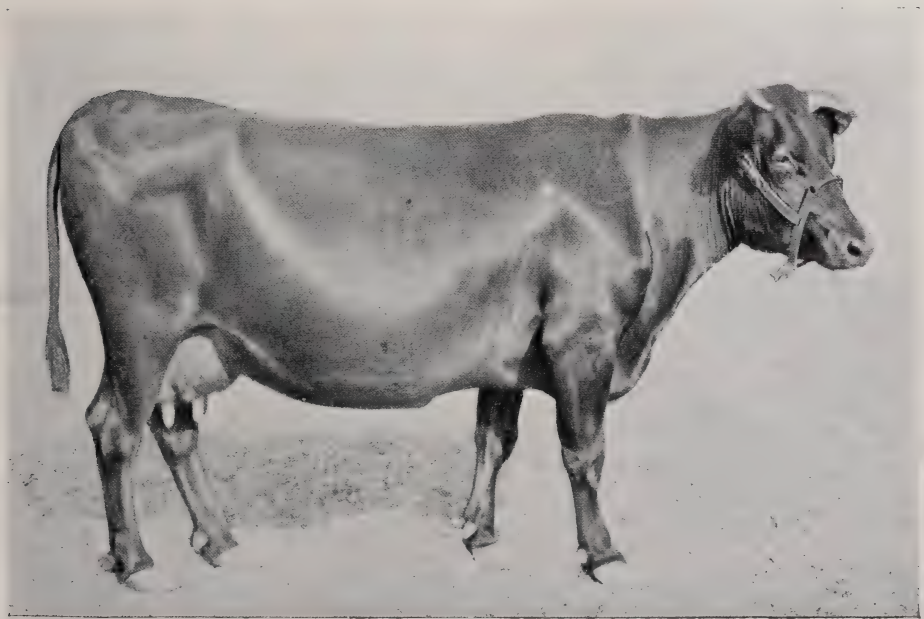


FIG. 2.—Cow of Red Danish Dairy Breed, "Jenny III" (Cow Herdbook 490).

Yielded		Milk lb.	Fat per cent.		Butter lb.
1914-1915	...	10,527	...	4.81	570
1915-1916	...	14,128	...	4.58	728



FIG. 3.—Bull of Jutland Breed, "Silva Hannibal" (Herdbook 2218),
5 years old when photographed.

Owners: Sattrup-Monbjerg Cattle Breeding Society.

Average annual yield of Dam for 3 years: 10,187 lb. of Milk 3.55 per cent. of Fat 403 lb. Butter.



FIG. 4.—Cow of Jutland Breed, "No. 17, Marie IVa" (Herdbook 117).

Owner: Johs. Overgaard, Stautrup.

Average annual yield during 9 years: 10,222 lb. of Milk, 3.92 per cent. of Fat, 447 lb. of Butter.

from among his cows the healthy and well-built animals giving the highest yields, and breed from these, and in order the better to secure these characters in the progeny he will use in-breeding or line-breeding, and thereby form *families*. It is not enough for him to know that the cows he breeds from have the productive qualities he desires to find again in the progeny; it is equally or even more important that he should know whether the cows have the ability to transmit these qualities to the progeny, either female or male. *The greater the number of high yielding animals a cow can count among her ancestors the more likely she is to pass on the quality of high yield to her progeny.* It therefore became of the greatest importance to farmers to know as much as possible about the descent of their dairy cattle, and for this reason *family herdbooks* were introduced, and the value of these depends to a great extent on the work of the milk recording societies. These family herdbooks are a special Danish feature, and are now kept by about 2,000 breeders, naturally including the very best of them.

Private herdbooks were kept by a few prominent breeders as far back as the sixties of last century, with the object of breeding cattle true to race or breed. The *Family Herdbook* is an invention of Mr. Mörkeberg, or rather, it is the result of his idea of putting into practical shape what he had learnt from prominent breeders in Great Britain during his early visits. Breeders spoke to him about "families" or "tribes" within their herds, and by families they meant the descendants from a certain cow tracing the descent only through the female side. These families differed from one another in certain characters. It was easier to keep in one's mind a picture, so to speak, of a large herd, when the animals in it were grouped in tribes or families. This led Mörkeberg in 1891 to draw up a family herdbook for the large and excellent herd of dairy cattle at Ourupgaard, belonging to Mr. Tesdorpf, who had kept records of the milk yield of his cows since 1860. The milk records were entered for each cow in the family herdbook. At that time there was no practical means of estimating the richness of the milk. These family herdbooks acquired an additional value for the breeding of dairy cattle for milk production from the time when the milk recording societies furnished reliable information on the yield of milk of individual cows by quality as well as by quantity, which information is noted in the herdbooks. Further, the milk recording societies did not restrict their action to furnishing figures for yield: they made the headings in their journals comprise all the information required for the family herdbook.

Following are two specimen pages of the Book of Record Sheets used by the Milk Recording Societies of Funen, giving, in the headings, the particulars of breeding, and below, the milk record of the cow for the year 1919-20, the latter being here condensed and translated into English weights and measures.

LEFT PAGE:

Year 1919/20. Cow No. 7. Name: Frigga VIII. (*Continued on right page*).

Sire: Kristoffer Damgaard. Herdbook No. 1,266. Born 21/9/09, on the farm of Fr. Hansen, Damgaard.

Dam: No. 13, Frigga V. Herdbook . . . Born 26/8/07, on the farm of A. Nielsen, Norremosegaard Kværndrup.

Winter term, 1 Oct., 1919, to 30 Apr., 1920.

On this page are entered details of nine milk records: date, weight of milk, and percentage of fat. From these are calculated: total weight of milk, and of butter, and number of kg. milk with one per cent. of fat, for each period covered by a record, the period having as far as possible an equal number of days before and after the day when the milk record was taken. The number of food units of fodder consumed are also entered, specifying cakes, other concentrates, roots, hay, straw, grass and green crops, and total food units.

The totals on the specimen page for the winter term of 7 months are:—

Days in Milk.	Yield of Milk. Butter.		Pounds of Milk with 1 % fat.	Days of feeding.	Total food-* units consumed.
194	lb. 13,045	lb. 583	52,132	213	5,957

RIGHT PAGE.

(*Continued from left page.*) **Born 3/10/12**, on the farm of A. Nielsen, Norremosegaard, Kværndrup. **Herdbook of Cows: No. 892.**

Calved last year: 27/10/1918.

Calved this year: 19/10/1919.

Sire of calf: Kristoffer Lunde II; born 1/9/16. Sex: Bull calf; Marked No. 7. How disposed of: reared.

Summer term, 1 May to 30 Sept., 1920.

Similar particulars from 8 records taken during summer to those on the previous page for the winter term.

Total result for the year.

Yield of Milk.	Per cent. of fat.	Yield of butter.	Pounds of milk with 1 % fat.	Days of feeding.	Food-units consumed.*
lb. 19,319	3.90	lb. 841	75,250	366	8,860

* Taking 1 lb. of barley as the unit.

The controller and the farmer himself must fill in these headings, giving full particulars of the cow whose yields are entered on the pages below, of her sire and dam, her calf for the year in question and the date of service. By helping farmers to get these particulars, on which the drawing up of the family herd-book depends, carefully noted in the milk recording journals, the milk recording societies therefore offer an essential and practical help to breeders of dairy stock, and a considerable agitation to get more and more farmers to keep family herd-books has been carried on by the milk recording societies.

The family herdbooks are not drawn up by the controller of the milk recording societies but by the more responsible Agricultural Advisers who are appointed, in order to help those farmers who apply to them, by the agricultural societies or the joint committees of breeding societies and milk recording societies. The State defrays part of the salaries paid to these advisers.

Official Herdbooks.—In the 'eighties official herdbooks were started, and these are to some extent based on the family herdbooks, and since milk recording societies became general the official herdbooks give information of the yield of the animals; in the case of herdbooks of bulls the yields of milk, percentage of fat and calculated yields of butter are given for each recorded year for dam, dam's dam, and so on, as far back as the information is available.

The Herdbook for Cows of the Red Danish Dairy Breed in Funen was begun in 1904. Only cows from herds with family herdbooks can be entered, and they must give above a certain minimum yield and belong to good families of dairy cattle. Six volumes, comprising 941 cows, have been published and are a valuable help to farmers wishing to buy bulls. The following table giving the yields of dam, dam's dam and sire's dam of bulls bought by the Cattle Breeding Societies* in Funen shows this better than many words.

Average Yields of Dams, Dams' Dams, and Sires' Dams of Bulls bought by Cattle Breeding Societies in Funen in different years :—

Year.	Dams.			Dams' Dams.			Sires' Dams.		
	Milk.	Per cent. Fat.	Butter.	Milk.	Per cent. Fat.	Butter.	Milk.	Per cent. Fat.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.
1905-06 ...	9,244 ...	3.59 ...	367	9,137 ...	3.53 ...	365	9,038 ...	3.67 ...	372
1908-09 ...	8,525 ...	3.75 ...	383	9,475 ...	3.55 ...	374	9,473 ...	3.74 ...	394
1911-12 ...	9,339 ...	3.95 ...	414	9,271 ...	3.76 ...	387	9,381 ...	3.75 ...	389
1914-15 ...	9,326 ...	3.94 ...	403	8,875 ...	3.81 ...	376	9,581 ...	3.73 ...	420
1917-18 ...	8,802 ...	4.11 ...	407	9,172 ...	3.92 ...	400	9,350 ...	4.13 ...	431

* On Cattle Breeding Societies or Bull Clubs, which are quite distinct from "Breed Societies," see the writer's book "Co-operation," p. 85.

In the 'nineties Danish farmers used to speak of "butter cows," at shows special classes were reserved for "butter cows," and certain herds or strains were spoken of as "butter strains." These terms are no longer in use, development having rendered them unsuitable. From the more elementary question as to the amount of milk and butter produced by a cow, attention was directed to the more important but also more difficult question whether the cow was able to transmit her high-yielding capacity to her progeny.

Prizes for Herds.—One way in which a solution was sought was by means of *competitions between entire herds*. Certain competitions had already been carried out in Funen in the 'eighties for one year at a time. Their object was to find herds which not only contained prominent animals but consisted of families of such, and from which a supply of good breeding animals could be obtained for the improvement of other herds.

When, in 1894, the Gerber method of estimating the percentage of fat in milk was introduced the leading cattle breeders in Funen wanted this item included in the judging, and they wanted the competitions carried on for two whole years. A new series of competitions between entire herds in Funen was therefore begun in 1894 and another similar series began in 1897 in Sealand. Each of these competitions was carried on for two whole years, during which time the competing herds were visited about six times each by a Committee of Judges, while young men were engaged to assist the judges by visiting each of the farms every twentieth day throughout the period, weighing and analysing the milk, weighing the fodder given to each cow, and making the requisite entries in the family herdbook. The family herdbooks in their fully developed form may be said to date from these biennial competitions. All the herds entered for the seven competitions in Funen and in other provinces had such family herdbooks made for them.

The first competition in Funen was in 1894-96, the seventh was held 1913-15. The herds were judged according to yield of milk, both by quantity and quality, and yield of butter (calculated from the yield of milk and percentage of fat), together with records of amount of fodder consumed and records of descent of and relationship between the animals. The best herds were awarded prizes and were officially recognised as "Breeding Centres."

The recording of yield of milk and butter and of fodder con-

sumed introduced into these competitions followed the lines which were afterwards adopted by the milk recording societies. The first two-year competition in Funen, begun on 1st October, 1894, therefore constituted in a way the first milk recording society. On the other hand it was the records obtained by the milk recording societies which in the following years enabled the various breeders to decide whether their herds stood any chance if entered in these competitions. The milk recording societies, therefore, in a way, may be said to have performed the preliminary sorting of the herds to be entered for the later competitions.

As indicating the progress in the breeding of dairy cattle the following table is of interest, as it gives the average results of yields of the herds entered in the first, fourth and seventh two-year competitions in Funen. There were entered at these three competitions 7, 18 and 10 herds respectively, covering 530, 777 and 304 cows respectively. The results are the average for *all cows*, including heifers, cows that did not calve during the two years, and cows not in milk.

		<i>Yield of Milk.</i>		<i>Percentage of Fat.</i>		<i>Yield of Butter.</i>
		gal.				lb.
1. 1894-96	...	697	...	3.44	...	266
2. 1903-05	...	853	...	3.53	...	334
3. 1913-15	...	934	...	3.83	...	398

These two-year competitions between entire herds comprising all the cattle on the farms are a special Danish feature. They were in 1897 acknowledged to be of so great importance that the Government gave an annual grant of £4,000 for four years, of which as much as £150 a year could be paid to the best breeding centres. This was an encouragement in a double sense. It was a reward to the good breeder, and it showed the farming world in general how much importance the Government attached to these competitions. Many more herds were therefore entered, and the State Grant became superfluous and was withdrawn except so far as to cover the cost of the administering the competitions.*

Milk Yielding Capacity Inherited Through Bulls.—The investigations had so far been restricted to the yield of cows. It had been proved by the records of the milk recording societies, coupled with the family herdbooks, that the character of high yield was hereditary and could be transmitted from the cow

* Peter Aug. Mørkeberg: "The Danish System of Cattle Breeding," this *Journal*, March, 1910, p. 1001.

to her progeny. The next step forward, and a most important advance, was made when it was ascertained from the records of the milk recording societies that the capacity to yield large quantities of milk having a high percentage of fat could also be passed on through the bull to his progeny with different cows. The bull, as it is truly said, is half the herd. It therefore became of the first importance to find which bulls had a beneficial and which an adverse influence in respect of yield of milk and butter, and particularly so if this knowledge could be obtained while the bull was still alive and in vigour for breeding. This, fortunately, could be done, because before the inauguration of milk recording societies it had already become a general practice to keep bulls for service for a number of years, and even as far as it was then possible, to judge the bulls by an examination of their offspring.

By the Law on Breeding of Domestic Animals, of 1887, the Government made an annual grant of £1,500 for prizes for bulls at District Agricultural Shows, to be awarded only to bulls more than three years old. By the Law of 1902 the amount was increased to £3,750 for prizes to be awarded at "State Shows."* It was a condition that the bulls for which prizes were awarded were to be kept for service in the country at least until 1st May in the following year. It was a further condition that bulls five years old or older should be judged through their offspring. Special shows of the offspring were to be held before the State Shows according to the following rules:† for bulls five years old or older, which had been serving in the district for at least $2\frac{1}{2}$ years, ten descendants must be shown; for bulls above six years of age, 3 years in the district, twelve descendants; for bulls above seven years of age, 4 years in the district, fourteen descendants; the young stock must be at least one year old and three of them may be bulls; of descendants of bulls over six years of age, three, and for bulls over seven years of age four must be

* A special Commission is appointed by the Minister of Agriculture to manage the State Shows for Stallions four years old or older and for Bulls three years old or older. The country is divided into 13 Show-districts. In each district is a Committee for Stallion Shows and another for Bull Shows. The Agricultural Societies appoint the other members, generally two to each of these Committees, and the Minister appoints the Chairman. The Chairmen of these Committees, together with the Government Live Stock Commissioners, form the State Show Commission under a Chairman appointed by the Minister. The Government defrays all the expenses of prizes at these shows, which are generally held every year in each district. These State Shows are now regulated by the Law of 8th June, 1912.

† These rules were slightly altered in later years, and more offspring are required to be shown.

yearlings. These " Offspring Shows " are also a special Danish feature.

By these means farmers had for a number of years been encouraged to preserve good bulls for service. While in 1887 only 371 bulls were presented at the District Shows, there were in 1908 more than 1,200 at the State Shows, and at some local shows as many as 250 old bulls are shown every year.*

The Law of 1902, by which time the milk recording societies had already collected many records of the milk yield of cows, offered a further grant of £750 to cattle breeding societies, " which, by showing superior offspring, have proved to be particularly capable of developing good strains of dairy cattle." Such breeding societies could compete for participation in this grant by showing, at the Offspring Shows, their bulls and one-eighth of the total number of their cows, and at least 2 bulls and 24 cows. One-fourth of the number of cows must be between one and two years' old, and for at least one-fourth of the number of cows two years' records of the yield of milk must be produced. Breeding societies have an additional claim to the grant if they show animals closely related to one another through sire or dam, that is, if they have formed or are on the way to form " tribes " or families of dairy cattle producing a high yield of butter.

When the Law was amended in 1912 the form of this grant was altered and further encouragement was offered to cattle breeding societies which had many of their cows under the control of the milk recording societies. A grant is offered for each bull belonging to a cattle breeding society when the bull is at least $1\frac{1}{2}$ years old and has been awarded certain prizes at shows, but the amount of the grant per bull varies from £4 to £5 or £6 according to whether less than half, more than half or more than three-fourths, respectively, of all the cows belonging to members of the cattle breeding society are being reliably controlled as to their yield of milk, by quantity and quality, and their consumption of fodder.

(To be concluded.)

* Mörkeberg, l.c., page 999.

PIGS FOR PORK.

SANDERS SPENCER.

DURING the past half century great improvements have been made in our farm animals, but probably no class of stock shows a greater advance than the humble pig, which has become quite popular beyond the ranks of the mere agriculturist. The change in public opinion has been marked, as within the memory of the present writer, extending, alas, over more than sixty years, the pig was deemed to be a mere necessary nuisance on the farm and was tolerated on account of its utility in converting inferior farm produce into that pork which formed a large portion of the meat diet of those connected with the land.

In the middle of last century the life of the pig was divided into three parts; the first continuing for some two months, was a fairly happy one, as the dam from whom it received the major portion of its sustenance was looked upon for that limited period as worthy of some food and attention in order that it might be enabled to perform its maternal duties successfully. This attention might in some cases have been continued for a short time after the separation of piglings and their dam, but in comparatively early life the store or growing pig had to fend for itself and to search for and even to steal the limited quantity of food which fell to its share for several months, frequently at least twelve months, or until the harvest of the year had been stored and a portion of it threshed, when in place of a spare and irregular diet the fattening pig lived for a few months in ease and idleness beside a continually well-filled trough.

In the olden times, which are still nick-named good, the fat pig of the period was usually one which had arrived at the mature age of eighteen months. It was a large pig of no particular type or form, whilst there was great variation in its colour, this last being controlled generally by the fancies of the residents in the various districts in which the fattened pig had been bred and fattened. This fancy for a fat pig of a particular colour was general and very marked, a belief existing in some parts of the country that the pork from a pig of a light colour was of far finer flavour than that furnished by a pig of a dark colour, whilst exactly the opposite opinion was as firmly held and acted upon in an adjoining district. As there existed very little difference in the form and character of the pigs common

in most parts of the country this preference for a pig of a certain colour was most probably attributable to fancy. There might have been some slight cause for the preference for a pig of a dark colour in those parts of the country where the hair of the pigs was removed by burning instead of by the more common plan of scalding, as the singed white pig did not present so pleasant an appearance to the eye and to the buyer of the meat as did a black pig which had been singed.

Until within comparatively recent years there was little difference in the class of pig and the degree of fatness between the pig killed for pork and the pig which was intended to be cured for bacon. Indeed, a very large proportion of the fat pigs were killed during the winter months and the same pig afforded both the joints of fresh pork which consisted of the loin, spare ribs, &c., and the parts intended to be salted and dried for consumption as bacon, during the following summer. There was thus little necessity for that variation in the age and degree of fatness of the slaughtered pig which exists to so great an extent at the present time, nor did there then exist that keen demand for small joints of pork from young pigs which has in recent years caused so great attention to be paid to the early maturing qualities of the smaller breeds of pigs.

The changes in the size, degree of fatness and age of the fattened pigs have originated in various ways. The introduction of railways and the consequent free movement of fat pigs from one district to adjoining or even distant ones had a great effect, whilst a still more potent influence may have been the enormous increase in the spending power of the wage-earning classes. The large joints of exceedingly fat pork and the heavily salted and thick sides of bacon from aged pigs are no longer saleable, even to those engaged in strenuous labour. The present demand is for small joints of pork and mild-cured bacon from young pigs, because these are finer in flavour and much more easily digested, and probably because a much larger quantity can be consumed without serious inconvenience.

It may also be possible that fashion was not without its influence on the change in the type of fat pig generally in demand. Some fifty or sixty years ago, when agricultural shows became common, the fashionable pig was small in size and excessively fat, the greatest offenders in these respects being the small white and the small black breeds of pigs, strongly supported by the then fashionable Berkshire pig. This craze for small and pretty pigs was speedily followed by

the equally senseless fancy for very large and very fat pigs, mainly consisting of potential lard. About forty years since the demand for a change in the quality of the pork and bacon to make them more suitable to the requirements and fancies of the consumers became so insistent that a few of the more practical breeders of improved pigs endeavoured to produce two distinct types of pigs, the one for the furnishing of fresh pork and the other more suitable for conversion into the mild-cured bacon which was becoming so exceedingly popular amongst all classes of consumers. At that period or a little earlier the improved or pedigree pigs were mainly of the so-called Yorkshire breed, which again was subdivided into large, medium and small types, the Berkshire and the Small Black. Of these the small white and the small black have disappeared owing to their unsuitability for supplying pork of the kind demanded and for conversion into bacon. Many other applicants for fame have arisen, of local origin, but greatly improved by selection and in many cases by the judicious infusion of outside blood.

Until within quite recent years the opinion was prevalent that almost any breed or type of pig was suitable for the fresh pork trade or for the bacon trade, and that it was far more a question of age and degree of fatness of the slaughtered pig than of breed or type. The persistence of the consumer in buying at the highest prices only the particular class of pork and of bacon which he desired for his consumption has had a great educational influence on pig breeders, who have of late paid far more attention to the requirements and even the whims of consumers, with the result that the variations between the fat pig intended for sale as fresh pork and the one intended for bacon curing have become quite defined.

There are three distinct types, size and degree of fatness, of joints of pork in demand in the various parts of the country. These are furnished by the so-called porker and fat pork types of pigs. The type of porker most in demand in London and the south-eastern parts of the country is one of some four or five months old and weighing alive from 80 to 100 lb. The porker more commonly consumed in the South Midland counties weighs alive 140 lb. when some six months old; and the fat pork pig is more generally demanded by customers in the North Midlands and the "Black country," and weighs from 250 to 300 lb. at twelve to fifteen months old.

It will be noticed that both climate and the strenuousness of the labour performed by the wage-earning classes appear

to have had an influence in determining the demand for the particular class of meat in the different districts. In selecting the parents for breeding pigs for pork one of the chief points for consideration is the ability to mature early, so that with liberal and judicious feeding the young pig will have become fat enough in early life to furnish a carcass of pork, with a full proportion of fat to the lean meat—or as it is commonly termed a ripe carcass of pork, with a comparatively small proportion of bone and offal. Excessive length of body is not so much a consideration as it is with pigs intended for conversion into bacon, as a long pig is generally one which requires some considerable time to develop and there is not so great a variation in the value of the different portions of the fresh pork from the porker as there is in the side of bacon—in which the middle portion of the side is about one-third more valuable on the market than the two end parts. Both boar and sow should therefore possess in a marked degree quality of bone, skin, hair and flesh in addition to those other qualities which are essential to success in breeding.

Although there may be some of the smaller types of pigs common in the southern parts of the country which will produce passable porkers, it is considered to be necessary for the boar at least to possess a considerable amount of improved blood of such a type as the Middle White or Berkshire breeds. These two breeds and their crosses furnish the pigs which are well nigh perfect for the manufacture of small pork. Should the white colour in the crosses be a point to be considered, as it is in many of the chief markets, this can best be secured by mating the Middle White boar with the Berkshire sow, when nearly all the produce will be white in colour or with occasional blue spots, whereas if the reverse crossing be adopted, there will be a far greater probability of the young pigs being dark in colour. Apart from this the first-named cross is perhaps to be less recommended, as the Middle White sows are considered to be generally somewhat more prolific and better mothers than the sows of the Berkshire breed, to be of a quieter disposition and to produce somewhat more milk.

At one time it was commonly believed that a cross-bred pig from two pure-bred parents of different breeds was superior to the pure-bred produce of either of the two pure breeds, and it must be confessed that there might have been some substantial ground for this belief in the past when so much greater consideration was given to line breeding than to the equally

important utility properties such as constitution, lean flesh and milk. Of late years a change has come in the practice and consequently in the belief, so that the keeping of pure-bred Middle White pigs for the production of small pork is becoming far more general, whilst for this branch of the pork trade there are also being bred large numbers of pigs which are the produce of ordinary country sows of the small type mated with Middle White or Berkshire boars.

It is claimed that the production of small pork is by far the most profitable branch of the pig industry because the sows cost less to keep, the pork costs less per lb. to produce, and the market value of the pork is higher than that from old and heavy pigs. The alleged decreased cost in the production of pork may be due to a very considerable extent, if not wholly, to the fact that young pigs need a smaller weight of food than older pigs to make a given increase in their live weight. Experiments have shown that a gradual but sure increase in weight of food is required for each pound of addition to the weight of the live pig. Against this advantage in the production of light weight fat pigs must be set the increased number of lives which have to be sacrificed to produce a certain weight. This is not at the present time so serious a matter, now that the price of weanling pigs is approaching the normal as it was a year or two since when pigs newly weaned were selling at prices up to £4 each. Under the latter condition the raw material in the form of live pig would have cost at least four times as much as it would now. This variation would not perhaps appear to be so large if the producer of porkers adopted the more profitable system of breeding the pigs which he converted into small pork.

With regard to the increased cost of the production of pork from older than from young pigs, Professor Henry gave the combined results of numbers of experiments carried out at various agricultural stations in the United States, and from them estimated that pigs weighing alive from 15 to 50 lb. required 293 lb. of food to make an increase of 100 lb. in their live weight, pigs from 50 lb. to 100 lb. required 400 lb., pigs from 100 to 150 lb. required 437 lb., pigs from 150 to 200 lb. required 482 lb., pigs from 200 to 250 lb. required 498 lb. and pigs from 250 to 300 lb. needed 511 lb. These figures show a difference of more than two-fifths between pigs weighing 15 to 50 lb. and those weighing 250 to 300 lb., the latter being about the heaviest weight of fat pigs marketed at the present time for pork purposes.

In the production of porkers, some breeders prefer a sow of somewhat larger scale than the medium-sized white and black sows referred to above, favouring a sow of the Large Black, Gloucester Old Spots, Tamworth, Cumberland, one of the two Sheeted types or even a Large White of a compact type, which they mate with the thicker and more compact Berkshire or Middle White breeds. In thus crossing less uniformity of size is obtainable, but objection is not always taken to this as it is possible to use the compact and thick pigs for conversion into small pork, whilst the more lengthy and growing pigs are fattened for the heavy pork or the bacon trades.

This crossing of the medium sized and large sized breeds of pigs is more common in the southern and midland counties than in those northern counties where large fat pigs only are mainly slaughtered, although even in this respect a change is noticeable in one or two of the largest markets in the north, where fat pigs weighing not more than two-thirds the weight general only a comparatively few years since, command the highest price.

It would thus appear that the demand for the old-fashioned fat pig of 300 lb. is gradually but surely passing away. If this be so a change may also be brought about in the system of producing the heavy fat pig. The plan which used to be commonly followed was to use a pure bred sire of any of the large breeds of pig, the Large White, Large Black, Tamworth, Gloucester Old Spots, Southern or Eastern Sheeted, Lincolnshire, &c., on the ordinary country sows or sows of any of the pure-breeds or crosses; to rear the young pigs well and then to run them on as stores or growing pigs without any great outlay in the purchase of foods other than those produced on the farm; and then when the pigs were several months old they were put up to fatten and fed mainly, and in many instances solely, on concentrated and comparatively expensive foods. The change to improved methods which has been observable of late years will doubtless be accelerated by the still greater change in the alteration in the degree of fatness and size of the joints of pork demanded by the consumer. It is more than probable that a change in the aim of the breeders of pedigree pigs may in due course be noticeable; compactness of form, quality of skin, bone and hair, and early maturity may receive a far greater amount of attention than mere size, the last a point which has in the opinion of many purveyors of meat been studied to an extent greater than advisable or desirable.

ROOTS v. SILAGE FOR DAIRY COWS.

A. W. OLDERSHAW, B.Sc.,

Agricultural Organiser for East Suffolk,

and

F. C. SMITH, B.A.

It is well known that in the Eastern Counties the system of ensilage has made great progress during recent years. In 1916 an experiment was conducted by one of us on the farm of Mr. C. C. Smith, Walton Hall, Felixstowe, to ascertain whether a ration of 60 lb. of silage could replace 60 lb. of mangolds and 7 lb. of straw chaff. It was found that there was very little difference in the amount of milk given by the cows fed on the two rations. Particulars of this experiment were given in this *Journal* for June, 1916. Since then it has been claimed that, owing to the fact that silage contains considerably more albuminoids than roots, it is possible to reduce the quantity of expensive concentrated food fed when silage is being used.

This argument appeared to be reasonable, and the matter was considered to be of sufficient importance to warrant the conducting of a special experiment to test the point. Mr. C. C. Smith again very kindly placed his herd of cows at Searson's Farm, Trimley, at our disposal, and the twelve most suitable cows in the herd were selected for the purposes of the experiment. Unfortunately some of the cows had calved rather a long time before the experiment commenced, and consequently their milk yield was getting somewhat low. It was decided to feed the following rations daily:—

<i>Silage Ration.</i>	<i>Root Ration.</i>
60 lb. Silage.	60 lb. Yellow Globe Mangolds.
2 " Dried Grains.	4 " Dried Grains.
2 " Decorticated Cotton Seed Meal.	4 " Decorticated Cotton Seed Meal.
10 " Chaffed Straw (Barley).	10 " Chaffed Straw.
14 " Kale (Marrow-stem).	14 " Kale (Marrow-stem).

All the marrow-stem kale was used up on 20th February, and from that time the rations fed were as above, without the kale. The silage fed was made from winter oats and tares, sown at the rate of 2 bushels of oats and 1 bushel of tares per acre. It was made in a cylindrical stave silo of the usual pattern. The green material was chaffed and elevated into the silo by a combined cutter and blower, the work being done on several days from 20th to 27th June, 1920.

Composition of the Rations Fed.—A sample of the silage was taken for analysis and was very kindly examined by Mr. W. S.

Mansfield, M.A., of the School of Agriculture, Cambridge, with the following results. For purposes of comparison the analysis of the silage upon which the experimental cows were fed in 1916 is also given.

Oat and Tare Silage on which experimental Cows were fed.

	1921 sample.	1916 sample.*
Water	73.55	72.30
Ether Extract	1.37	1.14
Albuminoids	3.10	4.96
Carbohydrates	12.09	9.75
Fibre	8.40	9.43
Ash	1.49	2.42
	100.00	100.00
Sand and Silicates ... ..	.27	

It is worthy of note that the 1916 sample contains considerably more albuminoids than the 1921 sample. The 1916 sample was made from oats and tares sown at the rate of 1 bushel of oats and 2 bushels of tares per acre, while the 1921 sample was made from the produce of a mixture of 2 bushels of oats and 1 bushel of tares. The larger proportion of the leguminous plant (tares) in the 1916 sample may account for the larger proportion of albuminoids present.

Mr. Clement Smith's herd of cows at Searson's Farm is recorded by the Suffolk Milk Recording Society, and the milk of the cows under experiment was weighed daily under their auspices, the milk recording sheets issued by the Ministry of Agriculture being used for this purpose. In the Ministry's milk recording scheme, when daily records are kept, the record sheet commences at Sunday afternoon's milking and continues until and includes the next Sunday morning's milking. The week ending 30th January, therefore, includes the afternoon milking of 23rd January and the morning milking of 30th January. For the sake of simplicity it was decided to utilise this plan in the experiment.

In order to give the cows an opportunity of becoming accustomed to their diet they were fed on their respective rations for a preliminary week, *i.e.*, the week ending 23rd January. The records in this preliminary week were not taken into account. The plan was adopted of changing over the rations, *i.e.*, feeding one lot of cows for four weeks with silage, after which they received roots, whilst the cows which received roots during the first four weeks of the experiment

* Analysed by Mr. G. S. Robertson, M.Sc., East Anglian Institute of Agriculture, Chelmsford.

received silage in the last four weeks. In this way it was hoped as far as possible to eliminate differences due to the individuality of the cows. After they had been under experiment for four weeks, when the first part of the experiment was over, an intervening week was allowed (ending 27th February) to enable the cows getting silage to become accustomed to the root diet and *vice versa*. The records of this intervening week were not taken into account. In the preliminary week ending 23rd January, the cows getting root had 14 lb. of chaffed straw and the cows getting silage 7 lb., but it was found that the root lot were not eating up their chaff, so it was decided to feed both lots with 10 lb. of chaff during the whole experimental period. It was found that both lots of cows ate up their food well. The total quantity of concentrated food fed to the six silage cows was 4 lb. \times 6 = 24 lb. This food, however, was not equally distributed, the cows giving more milk receiving rather more of both concentrated and coarse food, whilst those giving less milk received less food. The average daily ration of silage and root cows, however, was that given previously, the foods being measured and weighed daily in bulk for each lot. It was considered that this method was the best, in view of the varying milking capacity of the cows.

The composition (crude) of silage taken is that of the actual sample analysed by Mr. Mansfield.

Table showing composition of the Rations fed.

Total ingredients present in pounds.

Silage Ration.	Dry matter.	Protein (albuminoids).	Oil.	Carbohydrates:		Ash.	Digestible Crude Protein.
				Soluble.	Fibre.		
60 lb. Silage	15.87	1.86	.82	7.25	5.04	.89	1.68
2 lb. Dried Grains ...	1.79	.37	.13	.92	.30	.08	.26
2 lb. Cotton Seed Meal (Decorticated) ...	1.83	.84	.22	.50	.15	.12	.73
10 lb. Barley Straw							
Chaff... ..	8.6	.33	.18	4.24	3.39	.46	.08
14 lb. Kale	2.07	.35	.04	1.22	.24	.22	.25
* Total	30.16	3.75	1.39	14.13	9.12	1.77	3.00
<i>Root Ration.</i>							
60 lb. of Yellow Globe White-fleshed Mangolds	6.42	.60	.06	5.64	.42	.42	.42
4 lb. Dried Grains ...	3.59	.73	.26	1.84	.60	.16	.52
4 lb. Cotton Seed Meal (Decorticated) ...	3.66	1.68	.44	1.00	.30	.21	1.46
10 lb. Barley Straw							
Chaff... ..	8.60	.33	.18	4.24	3.39	.46	.08
14 lb. Kale	2.07	.35	.04	1.22	.24	.22	.25
Total	24.34	3.69	.98	13.94	4.95	1.50	2.73

Taking the composition of foods given in *Rations for Live Stock*, by Professor T. B. Wood, F.R.S. (Miscellaneous Publications, No. 32, published by the Ministry), the following table shows the composition of the rations fed during the first month of the experimental period until 20th February.

Quality of the Milk.—It is worthy of note that no offensive odour or other abnormality was noted in any of the milk produced during the whole period of the experiment.

The milk was not tested for fat content, as it was considered unnecessary to do so.

It used to be held that the feeding had a considerable influence upon the richness of milk, but more accurate investigations go to show that it has very little to do with it. The subject was discussed by Dr. Crowther in a previous issue of this *Journal*. He found that, provided the ration is sufficient to maintain the milk yield and general "condition" of the animal, the composition of the milk can, in general, be but little affected by changes in the nature of the foods. Even in the case of under-feeding the composition of the milk is, as a rule, but little affected until the condition of the animal has been very seriously reduced. The common view that turnips or brewer's grains give watery milk has received but little support from experimental investigations, although the long-continued use of these foods may lead ultimately to a general weakening of the organs of the body, and result in poorer milk. Ability to yield rich milk is inherent in the cow, and if more butter fat is to be got from any cow, it can only be done by feeding to get a greater yield of milk of the same quality.

Taking the figures for the two lots, we get the following:—

Silage (with chaff and 4 lb. daily of concentrated foods).

		<i>Yield of Milk in lb.</i>
6 cows of Lot I. fed on Silage	1st 4 weeks 23rd Jan. (p.m.)	3,366½
	to 20th Feb. (a.m.)	
6 cows of Lot II. ,,	Last 4 weeks 27th Feb. (p.m.)	2,634½
	to 27th March (a.m.)	
	Total ...	<u>6,000½</u>

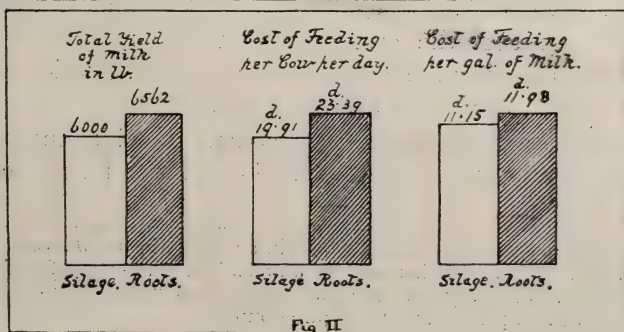
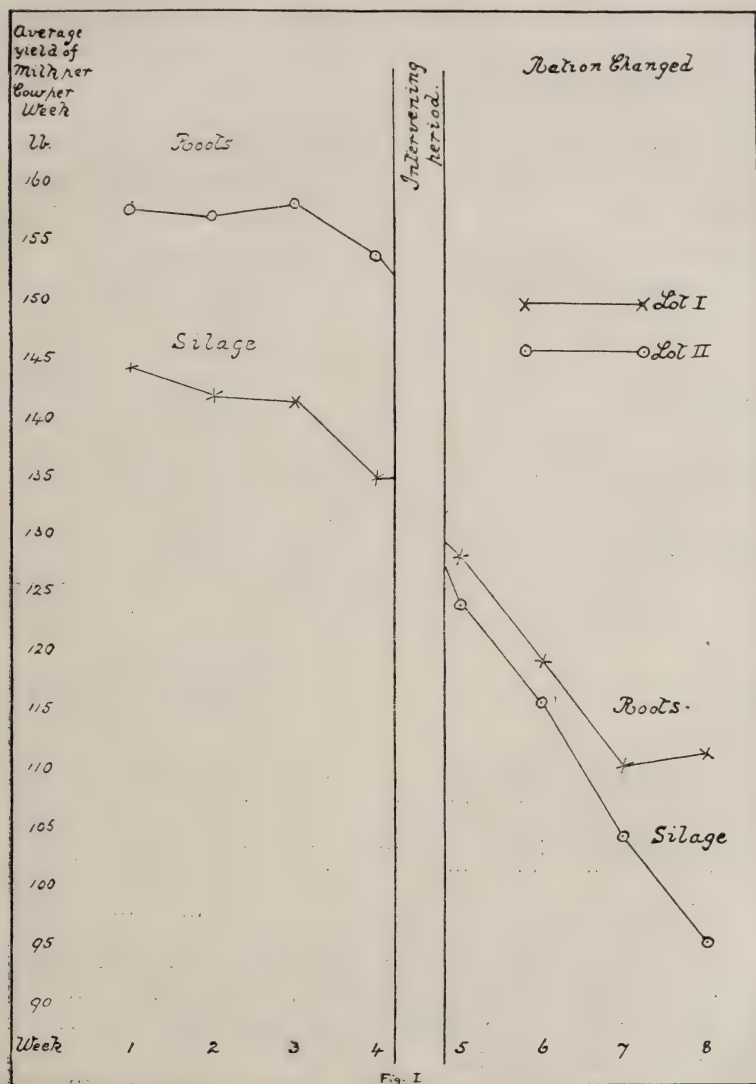
Roots (with chaff and 8 lb. daily of concentrated foods).

6 cows of Lot II.	1st 4 weeks 23rd Jan. (p.m.)	3,754¾
	to 20th Feb. (a.m.)	
6 cows of Lot I.	Last 4 weeks 27th Feb. (p.m.)	2,807½
	to 27th March (a.m.)	
	Total ...	<u>6,562¼</u>

Table giving weekly Milk Yield of Cows in pounds, 1921.

Ear Mark of Cow.	Date of Calving.	Silage, &c.					Roots, &c.					Total yield during experimental period.
		Week ending Jan. 30th a.m.	Week ending Feb. 6th.	Week ending Feb. 13th.	Week ending Feb. 20th.	Week ending Mar. 6th.	Week ending Mar. 13th.	Week ending Mar. 20th.	Week ending Mar. 27th.			
Lot I.												
K 2184	Oct. 7th	213	207½	220	206	176½	174½	163	159	1,519½		
K 2231	July 1st	151½	141	133½	125	99½	67½	39	34	790¾		
K 3410	Sept. 18th	120½	117	115½	110¾	110½	110	112	112	908		
*K 3988	June 19th	117	117	111½	108½	111	106½	103½	121½	896½		
*K 3993	July 4th	142	141½	141½	138	149	145½	141	143½	1,114½		
*K 3990	July 2th	119½	125½	125½	119½	122	109	103	94½	917½		
TOTALS	...	863½	848½	847	807¾	768½	713	661½	664½	6,173¾		
Lot II.												
Silage, &c.												
K 2132	June 1st	169½	166	170½	156	118¾	104½	84½	67	1,086¾		
K 2133	Aug. 27th	203	207½	202½	204½	172	166	150½	143½	1,449½		
K 2131	Sept. 14th	181½	181	188	186½	160½	154½	141½	135	1,328½		
*K 3994	July 14th	122	112½	104½	98	55½	44½	34	25	595¾		
*K 3991	Aug. 11th	130½	135½	141	136½	114	103½	95½	89½	946¾		
*K 3996	Aug. 6th	138	141	140	139	120½	120½	118½	115½	1,033		
TOTALS	...	944½	943½	946½	920½	741½	693½	624½	575½	6,389		

* Heifers.



It is evident from these figures that the cows fed on 60 lb. of roots with 8 lb. of concentrated foods daily, other foods being identical, gave 562 lb. (*i.e.*, about 56 gallons) more milk than the cows getting 60 lb. of silage and 4 lb. only of concentrated foods. This is probably a real difference and outside any possible experimental error. As the experimental period was 56 days, it follows that the difference in favour of the root-fed cows was $\frac{1}{8}$ th of a gallon daily per head.

Taking into consideration the cost of the two rations fed, we get the following:—

<i>Silage Ration.</i>					<i>Estimated or (in case of purchased foods) actual cost per ton.</i>	<i>Cost of Quantity fed in ration.</i>
					£ s. d.	d.
60 lb.	Silage	...	...	...	1 7 0*	8.70
2 "	Dried Grains	...	...	...	10 0 0	2.12
2 "	Decorticated Cotton Seed Meal	...	...	...	17 0 0	3.64
10 "	Chaffed Barley Straw	...	...	...	3 0 0	3.21
14 "	Kale	...	...	...	1 10 0	2.24
Total estimated cost of food daily per cow					...	19.91

<i>Roots Ration.</i>					<i>Estimated or (in case of purchased foods) actual cost per ton.</i>	<i>Cost of Quantity fed in ration.</i>
					£ s. d.	d.
60 lb.	Yellow Globe Mangold	...	...	...	1 0 0*	6.42
4 "	Dried Grains	...	...	...	10 0 0	4.24
4 "	Decorticated Cotton Seed Meal	...	...	...	17 0 0	7.28
10 "	Chaffed Barley Straw	...	...	...	3 0 0	3.21
14 "	Kale	...	...	...	1 10 0	2.24
Total estimated cost of food daily per cow					...	23.39

The total cost of the food of 6 cows for 8 weeks on the silage ration would thus be $6 \times 8 \times 7 \times 19.91d. = \text{£}27\ 17s.\ 5d.$, while that of the 6 cows for 8 weeks on the root ration was $6 \times 8 \times 7 \times 23.39d. = \text{£}32\ 14s.\ 11d.$

In the case of the *silage ration*, 600 gallons of milk were produced, so that the cost of food only per gallon of milk (excluding all other items such as labour, depreciation in value of cows, &c.) works out at 11.15d. per gallon.

The *roots ration* produced 656 gallons of milk, and the cost for food only works out at 11.98d., *i.e.*, almost 1s. per gallon of milk produced.

* The cost of production is dealt with in an article in this *Journal* for July, 1916, p. 333. The figure then arrived at, *viz.*, 13s. 6d. per ton for silage, has been doubled. Similarly, the pre-war cost of production of mangolds has been taken at 10s. per ton and the figure doubled.

This experiment does not take into account the somewhat greater cost of labour in feeding roots than in feeding silage. On the other hand, it also does not take into account the fact that if the cows give less milk, more cows are necessary to produce the same quantity of milk, and this involves more labour and more capital invested in the cows, buildings, &c., with a correspondingly greater depreciation in value of the larger number of cows necessary.

Conclusions.—From the results of the experiment it would appear that 60 lb. of oat and tare silage, fed with barley straw, kale and 4 lb. of mixed concentrated foods (equal weights of decorticated cotton cake and dried grains) gave about one-sixth of a gallon of milk per cow daily less than 60 lb. of mangolds fed with the same quantity of barley straw and kale but double the concentrated foods. That is, 60 lb. of silage was not equal in milk-producing capacity to 60 lb. of mangolds and 4 lb. of concentrated foods.

The cost of the silage ration, in the production of milk, however, was $\frac{3}{4}$ d. per gallon less than that of the root ration.

HOME CURING OF BACON.

Mrs C. E. CURTOYS.

It is a cause for general satisfaction that there has been a revival in the country districts of the home curing of bacon, especially during the past year. For a variety of reasons this thrifty and sensible practice had largely been given up. The importation of large quantities of foreign bacon for many years past had so reduced the price of the home produced article that country folk had begun to get indifferent about curing their own, and seemed to find it easier to run to the village shop for what they required. Then came the War, prices rose, and bacon realised unheard-of prices. We are still paying very large sums to foreign countries for bacon when every shilling is needed at home, and the imported bacon cannot compare in quality and flavour with our own home-cured.

There is no important reason why most country folk should not keep their own pigs and kill and cure their own bacon. The trouble is small, and is more than compensated for by the valuable return; the keeping of pigs is useful as well as profitable; all waste vegetables and chat potatoes can be boiled up and used for feeding the pigs; and the pigs in their turn will provide valuable manure for garden or allotment. The bacon pig does not require to be forced or richly fed, but should be fed steadily and regularly and not be over-fat. A plump pig of 10 to 12 score will make the best bacon, and a good bacon pig of about this weight should be ready at 8 or 9 months old. An eight weeks' old pig bought about May and fed through the summer should be ready about the following November.

Bacon can be cured in two or three different ways, all simple and easy, and involving no expensive paraphernalia. It can be (1) dry salted, (2) brine cured, or there may be (3) a combination of both. Some of the best bacon is cured by the last method, which has the further merit of effecting the curing most rapidly. The methods of curing commonly vary with the locality, but all three methods may be found in one locality. There are also different methods of cutting up the pig for bacon.

In the north, where pigs are weighed by the stone (14 lb.) and are mostly Large Whites, they are sometimes allowed to grow to a great size, and it is common to have a bacon pig weighing 40 stone. The usual weight, however, is 25 to 35 stone, and 25 stone is the best weight; beyond that the proportion of fat to lean becomes excessive and wasteful, and has a tendency

to turn rusty, yellow and rank when cured. On cutting up the pig it is the custom to cut a thick piece about four inches wide out of the centre of the back, right down from neck to tail. This is called the chine, and is cut up into four pieces, the neck chine being the largest. It is also the custom to take the hams off and cure them separately, as the hams of such large pigs would weigh from 30 to 40 lb. each.

In the south and south midlands the piece down the back is as meagre as possible, being the bare amount necessary to remove the backbone, and it is called the "Lazarus," presumably because it is so poor.

There are two ways of dealing with the flitches—(1) Country cut, (2) London cut. In the country cut the sweetbone, griskin and sparerib are removed and used or sold separately as joints. This is considered more profitable if selling the bacon, but for home consumption the curer will do well to use the "London cut," in which no meat at all is removed. The "sparerib," however, is nearly always taken out, except in a very small pig.

In Lincolnshire, where home curing of bacon is the rule, the "putting away" of the pig is one of the most important days of the year to the housewife. Every part of the pig is turned to account, and a wealth of pork pies and sausages as well as superior quality lard, is produced by the end of the day. There is a veritable feast for the labourer and his family for some days after the killing of the pig, and some of the excellent pies and sausages may be sold to neighbours. In the midlands and south not so much of this is done, the custom being to sell the spare meat as fresh joints instead of converting it into sausages and pork pies, the meat being somewhat differently cut out.

Killing the Pig.—This will usually be done by the butcher and cutting up should take place the next day. In some cases killing takes place on Saturday and cutting up on the following Monday. It is important to allow the meat to set. In very cold weather it is possible to kill and cut up the same day, and get the bacon in salt, but it is best to kill at least a day before. The butcher will kill and hang up the pig, and return the next day to cut it up, the housewife in the meantime preparing the materials for curing. The butcher should remove the knuckle bone from the hams and "draw" the shoulder blade to allow the salt to work into the meat.

Curing.—For *dry salting* the sides of pork should be placed on a low wooden bench the length of the pig, the bench being first sprinkled with a good layer of salt. If a bench is not available

boards placed on bricks will answer the purpose, and the writer has known bacon to be very well cured by simply laying it on a clean stone floor. With a moderate sized pig of 9 to 10 score the hams need not be cut out, but cured with the sides, using about 1 stone of coarse salt (about 2 bars), 1 lb. of saltpetre, and 1 lb. of coarse brown sugar. Some of the saltpetre should be well rubbed into the meat by hand, and especially into the rind, side and edges of the meat. The salt should then be rubbed well in, the remainder of the saltpetre and sugar should be mixed with salt and a fairly thick layer be placed on the bacon, the sugar especially on the thick part of the hams. The hand should be pushed into the shoulders and the hams where the bones have been removed and this mixture well rubbed in. Next day moisture should be drained off, the sides must be turned every two days, and a little more salt put over and under. The whole may be left in salt for a fortnight to three weeks according to the size of the pig. The head is split and salted for two or three days and will make an excellent brawn boiled with $1\frac{1}{2}$ lb. of lean beef and pressed. When the bacon is taken out of salt, it should be well scrubbed on the rind side and washed all over to remove surface salt, carefully wiped as dry as possible and hung up in a cool, airy place to dry. The washing prevents rust and the bacon will dry off clean. When dry the hams can be cut off, and to keep from flies they should be sewn up in unbleached calico and hung up in cool dry place, together with the flitches.

Brine-curing.—1 stone of salt, $\frac{1}{2}$ lb. of saltpetre and about 10 gallons of cold water will brine-cure one pig of about 10 score. The sides should be left in the brine for a fortnight to three weeks, or removed from the brine in a week, wiped dry and dry-salted for one week, a fortnight in all. A wooden tub or a tank would be used for the brine and should be long and wide enough to take the sides of bacon flat. This last method is more satisfactory than complete curing by means of brine. In dry salting the sides may be placed one on the other, but their position should be changed daily; as in all other things it is the care and personal attention that is most important in curing bacon and hams.

Hams can be pickled, if preferred to ordinary curing. A very good Wiltshire recipe is as follows :—Sprinkle the ham with salt after it has hung two or three days and let it drain. Make a pickle with 1 quart of strong beer, $\frac{1}{2}$ lb. of treacle, $\frac{1}{2}$ lb. of coarse sugar, 1 oz. of coriander seed, 2 oz. of juniper berries, 1 oz. of pepper, 1 oz. of allspice, 1 oz. of saltpetre, $\frac{1}{2}$ oz. of salt prunelle, a good handful of common salt; pound together, warm and pour over the ham; rub and turn every day for a

fortnight. Clean and dry off, and sew up in a thin calico bag.

A Wiltshire recipe for bacon for a pig of 8 score :—Sprinkle the flitches with salt and let drain 24 hours; then mix $1\frac{1}{2}$ lb. of coarse sugar, $1\frac{1}{2}$ lb. of bay salt, 6 oz. of saltpetre and 4 lb. of common salt; rub the mixture well into the bacon, turning and rubbing every part daily for a month; dry off and smoke 10 days.

A Berkshire recipe for curing a ham of about 16 lb. :— $\frac{1}{2}$ lb. of coarse moist sugar, $\frac{1}{2}$ lb. of common salt, 1 oz. of saltpetre, 1 oz. of bay salt, 1 oz. of ground black pepper. Dissolve over a slow fire and put the paste on the fleshy part of the ham as warm as the hand can bear it. When the paste is dissolved baste twice daily for a month, wipe well and dry off.

Curing a bacon pig of 14 score :—1 lb. of saltpetre, $1\frac{1}{2}$ lb. of coarse brown sugar, $1\frac{1}{2}$ lb. of salt; first day sprinkle with saltpetre, then mix remainder with sugar and salt; rub in well, finish with a good layer of salt; leave about three weeks, and during the last two days rub with a little pepper.

The Lard.—For lard which has to be rendered down for use, the leaf fat will have been carefully removed, also the apron fat and trimmings. The leaf fat is the finest and best and is rendered down separately. It is cut up into small pieces of about an inch and the fat boiled out, then it is passed through a fine strainer and poured into the bladder, which should have been thoroughly cleaned. This is done by turning the bladder inside out, scrubbing it well and soaking in salt water, subsequently drying. The apron fat and trimmings are also cut up, boiled down, and strained into jars or basins. Eaten with bread the scrap fat that remains after straining makes a pleasant and wholesome food for children, and is very popular with the young people. It is known as “crumps” in some parts. The leaf lard in a well-fed pig should weigh in lb. the weight of the pig in stones. Thus, for a 25 stone pig there should be about 25 lb. of leaf lard. If well boiled it will keep for a year.

The meat trimmings can be turned into pork pies and sausages and will make a pleasant change for breakfast fare. The whiter pieces are used for sausages and the darker for pies.

In Lincolnshire, parts of the pig are used in the Christmas mincemeat and it must not be forgotten that the fry, consisting of the liver, sweetbread and pluck, makes a variety of savoury dishes which are a welcome relief to the monotony of the poor man's daily fare. It will be readily seen that a pig is a mine of wealth to the poor man, who should be encouraged by every means to keep pigs of his own.

ROYAL COMMISSION ON IMPORTATION OF STORE CATTLE.

THE Royal Commission on the Importation of Store Cattle, appointed on 11th May, 1921, issued its report in the middle of September. The Commission was appointed to inquire into the admission into the United Kingdom of live stock for purposes other than immediate slaughter at the ports; whether such admission would increase and cheapen the meat supply of the country, and, if so, to what extent; and whether such admission is advisable, having regard to the necessity of protecting live stock bred in the country from the introduction of disease and of restoring their numbers after the losses to which they have been subjected during or since the War.

The Commissioners for the purpose of the inquiry were:—Viscount Finlay, Lord Askwith, Sir A. F. Firth, Bart., Sir A. E. Shipley and Sir W. H. Peat, with Mr. A. W. Cockburn as Secretary.

The conclusions at which the Commissioners have arrived are as follows:—

(1) We are of opinion that the admission into the United Kingdom of Canadian cattle for purposes other than immediate slaughter at the ports, would tend to increase the meat supply of the country to some extent, but it must not be assumed that the increase in the meat supply would necessarily be equivalent to the whole number of cattle so admitted, as it is possible that some of them might merely replace stores raised in Great Britain or Ireland.

(2) We think that such admission would tend to cheapen, in some measure, the meat supply of the country, but there are no data on which the extent can be accurately gauged. We think, in the long run, the tendency would be to bring prices to a level somewhat, but not greatly, lower than that which would prevail if the embargo were maintained.

(3) We think that the importation of Canadian stores would tend to satisfy in some measure the increasing demand for fresh home-fed meat.

(4) We are of opinion that such admission is advisable, as providing another source for supply of stores for the purpose of scientific agriculture, with a consequent increase of the food supply.

(5) We are of opinion that there is no substantial ground for the apprehension that such admission would introduce disease among the cattle in this country.

(6) We are of opinion that such admission would not interfere with, but would tend to promote the restoration, and, indeed, the increase of the numbers of live stock in this country after any losses sustained during or since the War.

(7) We are of opinion that the introduction of Canadian cattle would not have any prejudicial effect upon the milk supply of this country, but would, on the contrary, tend to its advantage.

(8) We find that there is a general feeling among English farmers against the admission of Canadian stores. So far as this is created by the apprehension that disease may be thereby introduced, we consider it unfounded. So far as it is based on the view that the prohibition should be kept up for the protection of the home breeding industry against competition, we do not think that the question of such a policy falls under the terms of our reference. As we have pointed out, the cost of transport to England in itself forms a considerable measure of protection to the home breeder.

(9) We are of opinion that the admission of Canadian stores might make it difficult for crofters and small farmers in the Highlands to carry on their farming operations successfully owing to competition with them in the market for the sale of stores.

(10) We are of opinion that the admission of Canadian stores might to some extent deprive the Irish farmers of the market which they at present enjoy in Great Britain for their stores.

(11) We have not thought it within the terms of reference to enter into questions of Imperial policy, as regards the food supply of the country in time of war, protection of home industries, or the effect of possible political changes in the Constitution of the United Kingdom.

INSECTICIDES AND FUNGICIDES.

HORTICULTURISTS are probably aware that, at the request of the Chamber of Horticulture and an important section of insecticide and fungicide manufacturers, a Bill has been drafted for the regulation of the trade in certain of the chemicals most generally in use for the control of pests, and especially for ensuring that the grower should have at his disposal fungicides and insecticides of guaranteed composition. In view of the Cabinet instructions on national economy it has proved necessary to postpone the introduction of this Bill to Parliament, but it is believed that many manufacturers are prepared to meet the terms of the Bill without previous legislation, and it has therefore been decided to publish certain of the more important provisions both for the information of the public in general and the manufacturers in particular. Purchasers of insecticides and fungicides of kinds mentioned below are earnestly advised to stipulate before taking delivery that the articles supplied should comply with the conditions laid down.

These conditions and the articles to which they apply are as follows:—

1. **Lead Arsenate Paste.**—(a) The total amount of arsenic in lead arsenate paste as sold for agricultural and horticultural purposes shall not be less than 14 per cent. of the paste in the condition in which it is sold, nor less than 28 per cent. of the paste when dried at 100° C., the arsenic being expressed in terms of arsenic oxide (As_2O_5).

(b) The amount of water-soluble arsenic in the paste as sold shall not exceed 0.5 per cent., expressed as arsenic oxide (As_2O_5).

(c) The actual percentage of arsenic in terms of arsenic oxide (As_2O_5) in the paste as sold shall be stated on the label together with the dilution required to produce a standard spraying mixture containing 0.1 per cent. of arsenic oxide (As_2O_5).

(d) The amount of substance other than arsenate of lead and water in the paste as sold shall not exceed 3 per cent.

Note.—So far as the purchaser is concerned the most important provisions are those under *b*, *c*, and *d*, above, and he should realise the reasons for them. As regards *b*, arsenic in a water-soluble form is very likely to cause injury to foliage, and its presence in lead arsenate spraying compounds has at times resulted in serious losses. It is therefore necessary to prescribe that the water-soluble arsenic contained in a paste should not exceed a certain percentage which has been shown to be harmless.

Regarding *c*, lead arsenate paste consists primarily of mixtures of lead arsenates and water, some containing more water, others less. It is evident, therefore, that if all makes of lead arsenic are diluted to the same extent the resulting spray fluids may be either too weak or unnecessarily strong. The purchaser clearly should know the "strength" of the paste he is buying, and to this end it is laid down that the label on the container should state the percentage of arsenic which the paste contains, and as this must be stated in chemical terms which may not be clear to all, it must also be stated what dilution is required to make up a standard spraying mixture containing 0.1 per cent. of arsenic oxide. Such a mixture may be regarded as effective under all conditions, although for use against young caterpillars it may be unnecessarily strong. There is no difficulty, however, in diluting it to make a $\frac{3}{4}$ standard mixture. Thus in the case of a paste containing 20 per cent. of arsenic oxide, the standard mixture consists of 1 lb. of paste to 20 gallons of water, but $\frac{3}{4}$ lb. to 20 gallons may be used early in the season against small caterpillars.

In any case a standard mixture may be obtained by adding 1 lb. of paste to a number of gallons of water equal to the percentage of arsenic oxide—1 lb. to 20 gallons, with a paste containing 20 per cent., 1 lb. to 15 gallons with a paste containing 15 per cent., and so on.

In the case of *d*, when lead arsenate paste is purchased, the article should obviously not consist of some other arsenate, as for instance calcium arsenate. It is therefore laid down that apart from water, the total impurities in the paste should not exceed 3 per cent.

2. Lime-Sulphur (Solution of Sulphides of Calcium).—

(a) Lime-sulphur solution as sold for agricultural and horticultural purposes shall be made from lime, sulphur, and water only.

(b) The specific gravity of the solution as sold shall not be less than 1.3 at 15° C.

(c) The solution shall be free from suspended matter and shall remain clear at all dilutions.

Note.—Lime-sulphur from the chemical standpoint is exceedingly complex, but it is clear that the purchaser should obtain only lime (calcium) and sulphur in the solution (requirement *a*). He should also know that he is getting an article sufficiently strong to make an effective spray fluid at the dilutions usually advised (requirement *b*). Finally, since the active chemicals in the solution are all soluble he should not be sold a proportion of inactive "sediment" or "sludge" (requirement *c*).

3. **Nicotine.**—It is proposed to deal under the Bill with nicotine when sold as such, but the exact requirements are still under discussion. Purchasers of nicotine should, however, note that while the term nicotine is properly applied to the chemical in its free or uncombined state, it is sometimes used by sellers for combinations of nicotine with an acid—e.g., nicotine sulphate. Nicotine sulphate is an excellent insecticide, but it depends for its action on the nicotine it yields,

and this nicotine must be released by mixing it with an alkali or spraying soap (which is sufficiently alkaline). Further, a nicotine sulphate spraying solution can only be valued by the percentage of free nicotine it yields and not by the percentage of nicotine sulphate. It is therefore important to purchasers of nicotine that they should have a statement from the seller as to (1) whether the article is free nicotine or nicotine in combination, such as nicotine sulphate, and (2) the percentage of free nicotine in the article, or if the latter contains nicotine in combination, the percentage of free nicotine which will be produced on treatment with an alkali.

4. Copper Sulphate.—Copper sulphate sold for use in a spraying mixture shall contain not less than 98 per cent. of crystallised sulphate of copper ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$).

Note.—No comment is needed on this requirement, as it is obvious that if a purchaser needs copper sulphate for making a fungicide, he requires it free from impurities such as “green vitriol.”

5. Soft (Potash) Soaps.—(a) Not less than 95 per cent. of the total alkali present in soft—that is, potash—soap sold for spraying purposes shall consist of potash.

(b) Soft, or potash, soap sold for spraying purposes shall bear a label giving separate percentages of (1) the fatty acids, and (2) the resinous acids, which the soap contains.

Note.—Soaps used for spraying are almost always “soft soaps,” and typically such soaps are made by the combination of potash with a fatty acid. Some “soft” soaps may, however, contain considerable proportions of less valuable forms of soap—as, for instance, that produced by the union of soda with a resin acid. Potash being more expensive than soda, there is always a tendency in the cheaper soft soaps to introduce soda-resin soaps, which have the disadvantage of producing a most objectionable curd with water which is at all hard, blocking the spraying tackle and reducing the efficacy of the spray fluid. It is therefore essential that growers should be able to purchase potash (soft) soap with the guarantee that it is really made with potash, and the knowledge that fatty acids have not been replaced by resin acids.

6. Liver of Sulphur.*—(a) An article sold as “liver of sulphur” shall consist of a mixture of salts of potassium, chiefly sulphides.

(b) It shall conform to the characters and tests given in the

* The Ministry is anxious that this recommendation should not in any way discourage the use of the sulphides of sodium. Since the action of either potassium or sodium sulphide depends on the sulphur and not on the potassium or sodium, it is undesirable to discriminate in any way against the sodium compound. When the time should come for proceeding with the proposed legislation this point will require further consideration in conjunction with the industries concerned: in the meantime it is desired to present the recommendations as nearly as possible in the form in which they were agreed.

British Pharmacopæa 1914 for sulphurated potash; and shall contain not less than 42 per cent. nor more than 45 per cent. of sulphur as determined by the process prescribed in the British Pharmacopæa for the estimation of sulphur in sulphurated potash.

Note.—Liver of sulphur is now used less often than formerly, but nevertheless those who do purchase it should obtain the potassium salts as defined above and not the cheaper sodium compounds. This remark does not imply any comparison between the values of the potassium and other sulphides for spraying purposes, but is merely to point out that if a purchaser is paying for an article, he should be supplied with it and not with something else, which perhaps costs less to manufacture.

7. Sodium and Potassium Cyanides.—(a) An article sold as sodium cyanide for agricultural and horticultural purposes shall be capable of evolving (when treated with an acid) not less than 56 per cent. of its weight as hydrocyanic acid.

(b) An article sold as potassium cyanide for agricultural and horticultural purposes shall be capable of evolving (when treated with an acid) not less than 43.7 per cent. of its weight as hydrocyanic acid.

Note.—In fumigating with hydrocyanic acid gas it is of the utmost importance that the dose shall be accurately calculated, and this of course is impossible unless the purchaser can obtain the "cyanide" practically pure. Purchasers should therefore insist on a guarantee in accordance with the above requirement. Sodium cyanide is almost invariably used, as it is cheaper and weight for weight gives off more gas than the potassium cyanide. The latter is included, however, in case any should still prefer it.

8. Formaldehyde.—This substance is not at present within the scope of the proposed legislation, but it is desirable that it should receive mention here on account of its increasing popularity as a dressing for cereals against bunt, &c. Formaldehyde is often referred to as "formalin," which was originally the trade name applied by a German company to a 40 per cent. solution of formaldehyde. It is important now that under whatever name formaldehyde is bought a guarantee should be obtained as to the percentage of formaldehyde in the solution supplied.

DORSETSHIRE ARTS AND CRAFTS, 1921.

MISS M. B. MANSEL.

A GENERAL survey of the year's work done in connection with the Dorset Arts and Crafts Association is full of encouragement. Classes have sent their work to various exhibitions. Keeness is everywhere apparent, and in spite of the fact that the annual county exhibition was held during the coal strike, which paralysed transport, exhibits and visitors were above the average in number. The high standard of work required by the judges in no way discouraged the efforts of individuals or class work. What we earnestly endeavoured to inspire in workers in all handicrafts is the desire to achieve the *highest*, both in design and execution, bearing in mind that the work sent is primarily for *exhibition* and that sales must be subordinate to the first principle. Sales are welcome and necessary: without them it would be impossible to "carry on" and repay the initial outlay, the cost of all kinds of material being still very high. Reputation for good work should ensure a good sale.

The Dorset Arts and Crafts Association has been in existence for 15 years and has held an exhibition each successive year, which has proved exceedingly valuable in setting up a high standard of work. Medals and certificates of merit are much sought after, and only awarded by the professional and expert judges when they reach the necessary standard. Criticism is sometimes very drastic, but at the same time all possible encouragement is given: both inspire further efforts to produce a better class of really artistic and practical articles.

The exhibition is useful, not only in stimulating and developing class work, but also in assisting individuals—blind, disabled and others—by advertising, selling their goods, and procuring orders for them. Letters have been received testifying to the real help the Association has been in bringing the products of the workers before the public, both by means of the exhibition and by privately advertising and pushing their wares. It is very much to be hoped that the Association has a long career of usefulness and prosperity before it.

Development.—Mr. Berens, who instituted the Studland and Swanage Arts and Crafts class, which includes leather work, metal work, needlework, wood and stone carving, painted and gilt wood, emphasises to his pupils the principle of originality in

design, demonstrating and pointing out when designs are faulty, and not permitting them to be carried into effect until perfected. They make their goods—as far as possible—from start to finish, procuring the raw material, hides, &c., and going through the different processes until the finished article is produced, thereby instilling the pride of creation and achievement, as in the old days, before a manufactured article was dissected and allocated to different departments, so becoming a co-operative production. The Studland class has to work hard to keep pace with the orders which pour in from the home country and abroad, including America, China, Australia and New Zealand. Mr. Berens feels that nothing equals exhibitions for fruitful advertisement.

The Dorset Rush Industry at Blandford is very prosperous; many of the workers are now receiving weekly pay and a bonus on sales, which in the last year amounted to £159 6s. Orders could be accepted for mats in any number, kneelers, dog baskets, wind screens, &c. This industry has been taught in several Women's Institutes; much good and artistic work is turned out from them, finding a ready sale in our Dorset Arts and Crafts and other exhibitions. Permanent dyes for rush work, similar to those used in the bright and attractive mats made in Holland, are very much needed.

One of our oldest classes led to the establishment of the sunbonnet industry of Bloxworth. In this small village, an immense variety of sunbonnets is produced by the workers, in patterns and shapes of every nationality. They travel far, parcels being sent to India, America, Australia, South Africa, and Sweden. This industry has brought much pleasure and profit to those engaged in it; during the last year the not inconsiderable sum of £145 was taken in private sales and at exhibitions, the former mostly being the outcome of the latter.

Home-made dolls and toys—mostly of the soft variety—are made in some of the Village Institutes. These find a ready sale. Novelties in this line and a greater variety would be welcomed.

There is further always a large quantity of basket and really good raffia work done in Dorsetshire.

The Annual Exhibition.—Our annual exhibition included about 3,000 exhibits, and the judges had a very busy time. The general standard was said to have improved greatly since last year, especially in the case of ornamental needlework, while the lace (both Filet and Honiton) was far above the average. Needlework done by children in various elementary schools was much commended.

Amateur glove making is very popular and was really excellent of its kind. The sum of £37 was taken at the glove section; most of the gloves being contributed by members of the Women's Institutes.

There was an increase in both light and heavy metal work. We are justly proud of the fact that the highest award given in the recent Home Arts Exhibition, held in the Albert Hall, was gained by a Dorset man, a smith of Milton Abbas, for beautiful wrought iron work. This exhibitor, whose work is becoming well known and should command valuable orders, also gained a medal at the Dorset Exhibition. He is an artist as well as a craftsman, both in design and execution, and his gates and other decorative iron work have attracted much notice.

One of the most interesting and instructive exhibits was to be found in the section for "Raw Materials and their Uses." A variety of home-dye materials, prepared from local plants and lichens, showed from what portion of the plants the shades were obtained, both being displayed and labelled to demonstrate results. This had a scientific as well as practical interest and attracted much attention.

The pottery exhibited by Messrs. Carter & Co., of Poole, was—as always—a great and beautiful asset to the exhibition, which they loyally support by sending annually a dignified and rich collection from their well-known and important Dorset industry. We wish that more of the *professional* industries would send specimens of their various handicrafts as samples of what the county can produce.

The County Association for helping the Blind took a large space at the exhibition, in order to advertise all kinds of work executed by them. Basket work was shown in great quantity and greatly appealed to the visitors.

It is impossible in a limited space to deal in detail with much of the excellent work sent by hundreds of individual exhibitors, a great deal being for exhibition only. The total amount taken in sales generally was as good as in previous years, but it was noticed that the articles purchased were of a less expensive nature, buying-power being reduced and people having to think twice before purchasing some of the more valuable and expensive articles. The total amount taken in the two days of the exhibition was £301 3s. 4d., the Association claiming 5 per cent. and the sum of £286 2s. 0d. being paid direct to the workers. This does not represent the entire amount of orders taken at the exhibition and not paid for at the time.

The fact that purchases could be taken away before the close of the exhibition has been much criticised. Formerly it was contrary to our rules. On account of the enormous increase in postal and transport rates, however, no-one cared to incur the extra expense of subsequent delivery, which would in some cases have doubled the price of the article. Thus, when sales were invited, this rule had to be relaxed. In cases of class work, samples are reserved and shown for the purposes of securing orders.

The Dorset Federation of Women's Institutes.—The County Federation of Women's Institutes* and the Dorset Arts and Crafts work together, so that there is no overlapping. The Federation subscribes to the Association annually and the members are keen and interested competitors for the exhibition awards. Last October a "School" for teaching handicraft to members of Women's Institutes was held in Dorchester, which included classes for glove and slipper making, rush and basket work, cane and rush seating of chairs, upholstery, decorative needlework, thrift rugs, cobbling and soldering. Those who took lessons in any of the above crafts that are circulated in the Arts and Crafts Schedules, sent specimens of their work to our annual exhibition, and were only permitted to become instructors in the Women's Institutes if they obtained some award from the expert judges. The qualifying of thirty-eight teachers is the outcome of last year's "school," they having successfully passed the standard demanded by the judges in the Dorset Arts and Crafts Exhibition. It is proposed to hold another similar "school" this autumn. Besides sending to other exhibitions, the Dorset Federation held a stall at the Royal Counties Agricultural Show held at Bournemouth last June. The number of articles sent was 1,110 and the sales realised £150. A keen and lively interest was shown in the "Institute" tent by numerous visitors to the show from other counties. There is no doubt that, from an industrial as well as from a social and educational point of view, the Women's Institutes represent a very progressive movement which should bring prosperity and happiness to every village where they exist.

* See this *Journal*, September, 1921, p. 543.

AGRICULTURAL STATISTICS: THEIR COLLECTION AND USE.*

SIR HENRY REW, K.C.B.

Importance of Statistics.—It is not necessary to place before the Section of the British Association which is specially concerned in the advancement of agriculture, arguments to prove that statistical information lies at the basis of agricultural progress under modern conditions. It is quite true that improvements in farm practice and in farm live stock were made long before any systematic attempt was made to provide statistics of agriculture, and that scientific enquiry into the processes of nature in relation to soils, crops and animals, is not dependent on statistical data. It is, however, also true that the farmer, the stockbreeder and the scientist, are all limited in their outlook unless they know the magnitude and scope of the problems on which they are engaged.

All economic statistics have two primary objects, one general and the other specific. The general object is to provide information for the Government, for publicists and economists, of the extent and progress of that section of national activity to which the statistics relate, and the specific object is to provide information for persons who are themselves engaged in the enterprise recorded. In the case of agriculture, it is evidently important that full statistical information should be available for the Government and the public, and it is equally important that farmers and stockbreeders should be provided with it—although it must be admitted that they do not all appreciate or use it.

If one had a free hand and unlimited resources, it would be pleasant to construct a complete and logical scheme of statistics to provide all the information which it would be desirable or interesting to obtain. Such a scheme would be devised to show:—

The extent of land used, with details of its utilisation.

The capital value of the land, its rent and tenure.

The amount of capital—fixed and moveable—employed.

The amount of labour—manual, animal and mechanical—employed.

The number of individuals providing the capital, management and labour respectively.

* Paper read before Section M of the British Association at Edinburgh, 12th September, 1921.

These particulars would give the factors of production fairly completely, and we should then want particulars of the output:—

Weight and value of crops and animals produced and marketed.

Weight and value of meat produced.

Quantity and value of other produce—*e.g.*, milk, cheese, butter, cider, honey, &c.—produced and marketed.

Having obtained a complete account of the output in gross and detail of agricultural land, it would still remain to get further particulars of its distribution and realisation, including statistics of supplies at markets and of the course of prices.

It is unnecessary to remark that the scheme thus outlined is a counsel of perfection, and that in a world which is imperfectly organised and disciplined from the statistician's point of view, the ideal is never likely to be fully attained.

Historical Progress of Statistics.—Nevertheless, the world does move, and it may be of interest briefly to summarise the progress which has been made in this country, which may fairly claim to have been the pioneer in the development of a national system of agricultural statistics.

As I have elsewhere remarked, the earliest attempt to collect agricultural statistics may be attributed to William the Conqueror. No doubt the Domesday Inquest originated in the royal desire for revenue, rather than in a passion for statistics, but it nevertheless provided a detailed return of the use and equipment of the land.

“ Every due of every wight
Within this England written stands
For all to read who have the sight :
Sokemen so many, tenants at will,
Cotsetters, men of tenant right ;
The Kine, the pigs, the weirs, the mill ;
Villeins with their oxen and plows.”

The manorial records may perhaps be described as agricultural statistics, and had they been collected and collated would have formed a continuous return for the whole country. It is only within the past half-century that the economic historian has arisen and his labours have revealed the extent of information contained in these documents.

In the absence of statistics, attempts were made from time to time to make estimates of English agriculture. The estimate of Gregory King, made in 1688, is well known. In 1808, Mr. T. Comber, and in 1827 Mr. W. Couling, made estimates, the former giving the acreage under various crops

with an appearance of precision which the data available to him would scarcely warrant. We have no means of testing the accuracy of these estimates, but it may be said that in the light of present information they are at least plausible. The need for accurate statistical information was generally felt, and various attempts were made by private enterprise to supply it.

In 1831, the magistrates of Norfolk attempted, with a fair amount of success, to collect agricultural statistics for their own county from farmers. An attempt a little later by the Board of Trade to collect statistics in Bedfordshire—as an experiment—failed. Whether the different result was due to suspicion of Government interference, or to the fact that the Board of Trade enlisted the co-operation of the clergy as collectors of statistics, need not be discussed.

In 1845, further local attempts were made in England, Scotland and Ireland, respectively. In Scotland and Ireland they were successful, but in England they failed. In Ireland, this attempt formed the starting-point for the establishment of a national system of agricultural statistics, the necessity for which had been forcibly demonstrated by a disastrous famine.

In 1849, the East Berwickshire Farmers' Club made an agricultural census of that county, and four years later the Highland and Agricultural Society made a similar effort in three counties. In 1854, the Society undertook on behalf of the Government, and with a grant from public funds, to collect statistics of acreage and produce for the whole of Scotland. This was repeated in the three following years, when owing to difficulties with the Treasury the scheme was discontinued.

Official Statistics.—In 1864, Sir James Caird carried against the Government of the day, a resolution in the House of Commons in favour of the collection of official agricultural statistics, and two years later the Board of Trade started the returns of acreage and live stock which have been since continued. Twenty years later—in 1885—annual estimates of the produce of certain crops were instituted. When the Board of Agriculture was established in 1889, the collection of agricultural statistics was transferred to it, and came under the charge of Major Craigie. Under his direction the system was gradually improved and extended, and after he left the public service the tradition which he established led to further developments, so that it may fairly be claimed that we now have in this country a system of agricultural statistics which, if not yet as complete as many of us would wish, is within its limits

probably better than in any other country. It has, indeed, formed the model on which many other countries have founded, or revised, their methods. Starting as we did, before most other countries, profiting by the lessons of long experience, and with so small an agricultural area to deal with as compared with most other countries, it would indeed be disappointing if we did not occupy a foremost place in this respect.

The basis of our agricultural statistics is the return obtained in June each year from every occupier of an agricultural holding of over one acre. This gives the acreage under each crop and the numbers of live stock of different classes on the holding at the date of the return.

Prior to 1917, this return was voluntary, but it was made compulsory by the Corn Production Act of 1917. There appears to be an impression in the minds of some that this alteration has affected the consecutiveness of the annual returns. This can only arise from unfamiliarity with statistical work on a large scale. Under the voluntary system there were some refusals, or failures, to make a return. The proportion varied in different districts, but over the whole country only about 3 per cent. of the total number of occupiers failed to fill up the form or to give the collecting officer information to enable him to do so. I have actually been asked whether the absence of this 3 per cent. implied that the totals published for the whole country were deficient to this extent, as though it were possible for any reasonably honest person to put his name to a statement purporting to give a total which he knew to be untrue. It is hardly necessary to say that it was part of the collecting officer's duty to furnish an estimate of the crops and live stock on any holding for which he failed to get an actual return. The fields and live stock of a farm are, broadly speaking, visible to anyone, and with the aid of the rate book it is not very difficult to make a fair estimate within a reasonable margin of error. The presence of 3 per cent. of such estimated returns could not seriously affect the validity of the totals.

It is also urged that a compulsory return is more accurate than a voluntary one. This is probably so in some degree, though the additional accuracy may easily be over-estimated. The important point is the absence of deliberate bias. If the persons making the returns have an interest, or think they have, in under-statement or over-statement of the figures, it may be confidently assumed that the returns as a whole will

give a result below or above the true figures. This will happen whether the return is voluntary or compulsory. To take a familiar instance. The Census returns are compulsory, but it is well-known that certain female age-groups are definitely inaccurate by reason of a general tendency to under-state the age. Any financial interest provides a still stronger motive.

In stating the acreage under each crop and the number of each class of live stock, the individual has no obvious reason for deliberate misstatement, and it is on the whole easier to give the true figures than to invent others. As the total acreage of the farm is taken from the rate-book and the sum of all the crops must make that total, a certain amount of trouble, for which there is no sufficient motive, is involved in compiling a statement which is untrue in detail.

While, therefore, I agree that compulsory returns are on the whole more accurate than voluntary returns, as well as more complete, the effect on the general total is practically negligible in a comparison of figures collected under both systems.

Returns of production of crops were first collected in 1885. In the nature of the case they cannot be obtained in June, but must be collected after the crops are gathered. They are, in fact, obtained in mid-October for the corn, pulse and hay crops, and in mid-November for potatoes and roots. The collecting officers are supplied with schedules giving for each parish the acreage of each crop as returned in June, and their duty is to enter the estimated average production per acre of each of the crops. They are instructed to arrive at their estimate after enquiries of growers, thrashing machine owners, valuers, &c. Much, however, obviously depends on the judgment and experience of the collecting officer.

It is sometimes objected that estimates are not ascertained facts—which is undoubtedly true. The system may be sufficiently defended on the ground that no other is practicable. but, in fact, it may also be claimed that no other is superior. Two other methods are possible. One is to obtain a return from every grower, and the other to rely on the ascertained results of a number of sample plots. A return from every grower would, of course, involve more trouble and expense and greater delay, but apart from this there are objections. In many cases the grower has no accurate record of the quantity of the crops—especially such crops as hay and roots which are consumed on the holding—but assuming he has the exact figures the difficulty

to which I have referred above arises. It will hardly be denied that there would be a constant bias in the returns from growers. Farmers as a class have an inherited tendency—bred of long generations of tenancy—to under-state the results of their farming. This unconscious mental bias, for which there is no reason under modern conditions, may be dying out, but there still remains the possibility of conscious bias. It is clearly in the interest of producers that any published returns of the year's harvest should not over-estimate the crops. The shorter the yield the better the price, may not always hold good in relation to products which are subject to world competition, but nevertheless it is an economic axiom which no producer is likely to overlook. If he is asked to make a return of quantities which he does not himself precisely know at the time of the return, it is obvious that he will take care to err on the side of caution. The cumulative effect of these tendencies upon over 400,000 returns would be substantial and the whole results would be invalidated.

Statistics of crops based on the quantitative results of sample plots are in theory not open to similar objection, but in practice it would be extremely difficult to arrange a system which would give accurate arithmetical results. Not only would the plots have to be so distributed as to represent all conditions of soil and situation for each crop, but the number of plots representing each variety of soil and situation would have to be proportionate to the whole area on which similar conditions prevailed. The yield of wheat given on heavy clay plots, for example, would have to be weighted by the total area of heavy clay land on which wheat was grown that year—and so on. Differences in manuring could to some extent be allowed for, but it would be difficult to make proper allowance for differences in cultivation. The sample plots would naturally tend to be above the average in cultivation, and especially in cleanliness.

From the collecting officers are obtained estimates of the natural weight of grain and of the yield of straw. They have also to furnish monthly reports on the appearance of the crops, and the general agricultural conditions, and to make forecasts of the probable yield of crops during the later periods of their growth.

Parliament has always been indifferent in regard to the collection of statistics. If this country does possess a system of economic statistics of which on the whole it has no reason to be ashamed, the fact is attributable to the persistent efforts of a few individuals, such as Sir Robert Giffen, Sir Alfred

Bateman, and their successors at the Board of Trade, and, in the sphere of agricultural statistics, Major Craigie, who have taken opportunities as they arose (the opportunity usually being the advent of a sympathetic and progressive Minister at the head of the Department) to obtain authority for a development of the statistics for which they were responsible. An enumeration of the population might, one would think, be regarded as an elementary need for the administration of the affairs of a civilised community, but it was not until 1801 that the Government decided to take a Census. A striking exception to the normal apathy of Governments and Parliament towards statistics and the ascertainment of economic facts, was the passing of the Census of Production Act in 1906.

I have already pointed out that official agricultural statistics were established and developed on the basis of a resolution of the House of Commons carried against the Government, and that it was not until 1917 that they were recognised by Act of Parliament, and then only because the State was incurring certain liabilities which necessitated returns of the acreage of wheat and oats.

There is, however, one class of agricultural statistics which has been collected under statutory authority for many years. In 1685, an Act was passed for the half-yearly settlement of the average prices of corn, and sixteen enactments having similar objects were passed at different periods from 1731 to 1882. Indeed, in connection with the Assize of Bread, there was a system of recording the average price of wheat as early as the thirteenth century. The latest Act under which the official prices of wheat, barley and oats are now ascertained, is the Corn Returns Act, 1882, which has in many respects become antiquated and the amendment of which has long been overdue. Its provisions have been further complicated by the Corn Sales Act recently passed. In Scotland farmers' prices have been fixed under statutory authority for about two hundred years.

Prices of other agricultural commodities have been for about 18 years collected and published weekly in the "Return of Market Prices." The system of collection, broadly, is that of the selection of a number of representative markets and the appointment of an official reporter who makes a return of the prices realised. A special feature of this Return is that the various local weights and measures used in the markets are

converted to a common standard, so that the prices in different markets may be readily compared. In my judgment, the practical value of this Return to the farmer in the conduct of his business is not sufficiently recognised. About 20,000 copies are distributed weekly, but they represent only a small proportion of those for whose use it is designed.

I have not exhausted the catalogue of returns, periodical or occasional, which may be included under the term "Agricultural Statistics"—the most important omission being the "Return of Agricultural Output" obtained in connection with the Census of Production. I hope it may be possible to repeat this, as originally contemplated, every five years.

My views on English Agricultural Statistics may no doubt be coloured by the fact that I have taken some part in their development. Others less influenced by parental feelings may not agree that the principles and methods on which they are based are unchallengeable. One may fully admit that they are open to discussion, but it may be claimed without hesitation that they are the result of very serious consideration in the light of long experience, and with a full knowledge of all that has been done in the same field by other countries. That the system is not perfect, is to say that it is the product of human effort, and it must be remembered that it was devised and extended under financial limitations of a much more stringent nature than have been recently imposed. "A fool can govern in a state of siege," says an old proverb, and it is not difficult to construct and administer admirably complete schemes if one can do so regardless of expense. With the resources available the British system of Agricultural Statistics (the English and Scottish systems being practically the same) is based on sound and practical lines.

Use of Statistics.—The subject of this paper was chosen by the Chairman, and I have not yet dealt with the last word of it. I have dwelt so long on the collection of agricultural statistics that there is little time to expatiate on their use.

The proposition that statistics are useful commands general assent at the present time. The old popular belief that official statistics were mainly intended to provide more or less amusing occupation for officials, and to furnish opportunities for elaborate perversions of the truth, has been in some degree weakened by the War. There is now, in fact, a popular demand for statistical information of all kinds, and the demand, as usual, produces the supply. If the information does not in fact exist

—as is frequently the case—it is forthcoming nevertheless from the fertile brain of an up-to-date journalist. Even in ordinary conversation one is constantly confronted with statistical “facts” in relation to subjects on which no statistics exist!

In this really lies the best reply to the question: “What is the use of Agricultural Statistics?” They are of vital importance to the producer. His whole business depends on information of the present and prospective supplies of the products which he has to sell. If that information is not obtained independently and completely, the enterprise of traders will furnish statements as to the supplies available which will not be compiled in the interests of producers, but which there will be no means of checking or contradicting. Similarly, the trader who is daily in the markets must necessarily have a wider knowledge of current prices than the producer who attends only one market occasionally. An independent record of market prices must therefore be advantageous to the producer.

Broadly, therefore, the main use of agricultural statistics is to supply, as far as humanly possible, facts, and thus to prevent the promulgation of statements which are inaccurate and interested.

To the administrator, the economist, and the sociologist, statistics of the use of land and the distribution of its products are indispensable to any intelligent survey of the economic life of the nation. Agriculture may no longer be the predominant factor in the national life, but it can never cease to have an overpowering significance in relation to the health and wealth of the people, and full records of its varied activities are essential to its maintenance and development.

A FRUIT DEMONSTRATION STATION IN EAST SUSSEX.

A. H. HOARE,

District Inspector of the Ministry.

THE value of fruit demonstration stations as a part of the horticultural education programme of County Councils is freely acknowledged, and this country does not lack instances of actual proof of this statement.

It is important, when speaking of *demonstration* stations, that the functions of such centres should not be confused with those of *research* stations. Their main objectives should be the practical demonstration of the best known cultural methods coupled with the gathering of information as to the behaviour of varieties, particularly the recognised commercial varieties, under local conditions of soil and climate. The information so obtained—and it is often obtainable with a minimum of expense—will be of inestimable value, and as a means of stimulating the production of home-grown fruit can hardly be overrated.

The establishment and outcome of one of the earlier fruit demonstration stations in the county of East Sussex is described below. In the year 1905 the education authority of the county considered, for the first time, the question of establishing fruit demonstration stations in those parts of the county where it was considered fruit growing was capable of development. The Horticultural Instructor, Mr. W. Goaring, was asked to report as to the suitability of the various districts for fruit growing and the possibility of establishing stations.

One such district which came under consideration, and was thought to be highly suitable for fruit growing, was that surrounding Frant on the borders of Kent and East Sussex. A piece of land was selected on the farm known as Lightlands, which is part of the Eridge Castle Estate. This piece of land, about one-quarter of an acre in extent, was part of a 7-acre field, the soil of which was a stiff loam overlying clay. The general situation was very favourable, the land sloping gradually to the south-west with belts of trees and undergrowth forming natural windbreaks upon the north and east boundaries.

As the result of negotiations with the estate agent, a remarkable and interesting agreement was made between the landlord and the County Council. Its main provisions were as follows :—

The Landlord agreed:—

1. To let the land to the Council for the purpose of a fruit demonstration station at an annual rent.
2. To erect and maintain a post and wire fence around the area.
3. To provide all the labour and farmyard manure required to carry on the work of the station. The said labour not to include that required for pruning and washing the trees.

The County Council agreed:—

1. To provide all fruit trees and bushes and plant the same in their quarters.
2. To fix and maintain a rabbit-proof wire netting in association with the landlord's post and wire fence.
3. To prune and wash the trees and bushes, and to provide all manures other than farmyard manure.
4. To hand over to the landlord all fruit grown with the exception of twelve fruits of each apple and pear tree and a small portion of the fruit of each bush.

The general supervision of the station was vested in the Horticultural Instructor.

With the signing of this very equitable agreement, the work of developing and planting the station was proceeded with, and in the year 1906 all the trees and bushes were established in their positions.

It was decided that two trees of each selected variety of apple, pear and plum should be planted at a distance of twelve feet apart each way. The following varieties were selected:—

Apples.

Bramley's Seedling.	Lord Derby.	Newton Wonder.
Lord Grosvenor.	Grenadier.	Warner's King.
Gascoigne's Scarlet.	Golden Noble.	Royal Jubilee.
Charles Ross.	Annie Elizabeth.	Ecklinville.
Adam's Pearmain.	King of the Pippins.	Ribston Pippin.
Allington Pippin.		

Pears.

Doyenné du Comice.	Beauvre d'Amalis.	Josephine de Malines.
--------------------	-------------------	-----------------------

Plums.

Emperor.	Czar.	Monarch.
----------	-------	----------

The station made excellent progress from the outset, and in four years from the date of planting the trees were nicely developed and soon afforded an opportunity of judging the worth of each variety for the particular locality.

The information thus gained proved invaluable, and it was not long before a general planting of fruit in the district was begun. One of the first to make a start was the landlord himself, who, upon seeing the satisfactory development of several varieties of apples, had the remainder of the seven acres planted up. Others followed suit.

It will not be out of place to repeat the statement made at the commencement of this article that the chief value of demonstration lies in the information obtained as to the varieties best suited to a district. The cost of establishing a station, when compared with the general benefit accruing to the district and the subsequent gain to the country in home-grown fruit, is almost infinitesimal.

The writer had an opportunity of inquiring into the subsequent history of the 7-acre field planted by the landlord. Accurate accounts have been kept and it will be of interest to give the yields of fruit for the last four years. The figures are as follows:—

Year 1917 approximately 2,000 bushels of apples.			
" 1918	"	1,000	"
" 1919	"	3,700	"
" 1920	"	500	"

The year 1920 was, of course, a bad year for apples in the south.

The present tenant of Lightlands, who is an old pupil of Uckfield Agricultural College, has largely extended the area under fruit. Fruit has similarly extended in the rest of the district, which prior to 1905 produced practically no fruit on a commercial basis. A fruit demonstration station could scarcely have accomplished more good in such a small space of time. It might be maintained that but for the pioneer work of the County Council, no fruit would yet have been grown in the district. The original station having now become a fully developed fruit plantation, and having, as stated above, achieved its object as a demonstration centre, the agreement with the landlord is about to be terminated.

THE STRAWBERRY CROP, 1921.

ISAAC WALTON, "The Compleat Angler," is accredited with saying of the Strawberry, "Doubtless God could have made a better berry but doubtless God did not." The lapse of years, the introduction from abroad of new and strange "Fruits of the earth," the phenomenal development of new varieties of fruit indigenous or acclimatised here, together have failed to dethrone the strawberry, in her season, from the regnant place in public favour implied in Isaac Walton's apostrophe.

The term "strawberries and cream" to many denotes the peak of attractive deliciousness during the short period of six weeks or so when the strawberry, crowding the markets, monopolises the attention of fruit sellers and buyers, and impresses the very atmosphere of the markets with its characteristic odour.

It is traditional that the public gives little consideration to links in the chain of production, transport, and distribution, along which travels the produce purchased at store or barrow. It grumbles at price, waxes sarcastic at the expense of the grower, or somebody else, when fruit is presented to it improperly packed, or in a damaged condition; but it has not the time nor the means to probe the matter through its successive sequences and find an answer to the "Why?"

It is time the public should be better informed, in order that it may be better served, for the dynamic force of public opinion is needed to help those who are striving to replace antiquities that are wasteful as well as obstructive, by methods of organisation sane, sanitary, and saving.

Most of the strawberries marketed in this country are raised in districts where the soil, climate and environment are suitable for the proper cultivation of the plants.

Kent, Wisbech Area, South Hants, Tamar Valley, Cheddar Valley, Middlesex, Surrey and Essex are the principal growing districts, and growers in each area take great pride in their local products, each considering their own to possess a better flavour than fruit produced in other parts. So does human nature help to bias judgment.

Most of the men engaged in this industry are the small-holders and ex-Service settlers on the land who on a few acres have settled down in earnest to secure an honest living by hard work and long hours in planting and caring for the strawberry plant. Much care is needed if the fruit is to be grown to perfection and commercial success achieved. Before planting the soil has

to be most scrupulously cleared of weeds, thoroughly cultivated, and brought to a "good tilth." The beds when planted must receive constant attention; and the successful grower must be ever stirring the soil to keep the surface loose and friable and at all times free from weeds. Much manure is needed and large crops cannot be gathered unless the ground has been adequately—one might even say abundantly—supplied with its proper quota of nitrogen, phosphates and potash. Lime is also necessary.

The crop produced, of course, varies with the treatment, class of soil, season, variety, and to some extent the district. This year, owing to the drought, the crop was unduly early and the season a short one. The yield varied; the Tamar Valley averaged nearly 2 tons to the acre; Cheddar, Hamsphire, and Wisbech not more than 25 cwt. per acre.

As the harvest season approaches the worries of the grower increase. The fruit is very tempting to boys, birds, and slugs. Each invasion must be met by its appropriate defence. Probably his greatest trial is at picking time. Picking commences at sunrise and is continued throughout the day until the dispatch of the trains to the market centres. During all this time everything is hustle—there is short time for sleep at night for anyone concerned, and no rest by day.

Where the holdings cultivated are not more than 6 or 7 acres in extent the picking may be managed by the grower and his family; up to 10 acres the help of neighbours may suffice; but for the picking on larger holdings there is an immigration of "pickers" attracted from various social classes. The preparation of accommodation for pickers in advance of their arrival, and the management of them when arrived constitute the most serious test of the grower's organising capacity and resource. At the conclusion of the picking season preparation for the production of next year's crop commences immediately.

A small proportion only of the fruit is consumed in the producing districts; the bulk has to be packed and sent to markets all over the British Isles, and, owing to the perishable nature of the berries, transport must be smooth and expeditious. This year the occurrence of the coal strike gave rise to fears of interference with the punctual distribution of the crop, and in order to help the growers, and to facilitate the best possible organisation of transport the Ministry stationed Inspectors in certain strawberry producing centres. These Inspectors kept in close touch with the growers, the Growers' Associations and the Rail-

way Companies, and were thus able to render assistance which appears to have been much appreciated by those concerned.

The Inspectors, being in touch with the business of picking and dispatch of the fruit, were able to study local methods and to note especially the kind of package used in each district, the type of van provided by the various Railway Companies and the treatment meted out to the produce during transit. A large amount of valuable information was collected and it is now possible to publish facts of some importance which the general public as well as all those engaged in the industry should know. It is hoped that a study of these facts may lead to further developments, and in particular, to the general adoption of a standard package, to better method of packing, and to more adequate and appropriate means, as well as methods of transport.

Packages.—The growers, speaking generally, use for strawberries a light basket, made of veneer, called “chip.” It is light in weight and proportionately small in cost. The question of uniformity in size has received but little consideration. It is probable that baskets of some 12 or 15 different sizes are in use, which naturally hold different quantities of fruit; the baskets of fruit, moreover, are seldom weighed before dispatch. Such a lack of system is bound to cause confusion on the market, bewilderment to the buyer, and increased cost to the consumer. For example the Tamar Valley uses a locally-made basket holding about 3 lb. of fruit; the Hampshire and Wisbech growers use a very slightly larger basket which is sent to market as a 4-lb. basket; Cheddar growers use a larger basket into which they pack 4 lb. of fruit; Kent and Middlesex growers use the 1-lb. chip punnett for “dessert” quality and the 10-lb. peck or tray for “jam” fruit. The confusion could be avoided, the bewilderment cleared and the cost to the consumer lessened by the adoption of a “standard” basket, and withal, the grower would stand to gain. Which is the best size of basket to use? Should it hold 4 lb., 3 lb. or 2 lb. of fruit? To settle these questions all sections of the industry must confer together, and decide upon a basket that will be acceptable alike to growers, wholesalers and retailers. Judging from the observations of the Inspectors as well as from other indications a basket large enough to permit of 3 lb. being packed so that the top of the fruit is below the level of the rim, would appear to be the most likely to gain general acceptance.

Again, a cover is usually placed over each basket of fruit, particularly for transport by railway. For this purpose, muslin,

grease-proof transparent papers, dull papers and cardboard are all used. The particular type chosen depends more on local custom than on merit. The Ministry's Inspectors point out that paper covers have many disadvantages; they give no protection to the fruit, moisture or heat is unable to escape, and buyers in the market have to tear the paper to see the quality of the fruit. Muslin is superior to paper and generally gives satisfaction, except where the fruit is subject to rough treatment during transit or in the markets. For general use a cardboard cover or a very light chip-wood cover would be preferable because of the added protection that would be afforded to the fruit. This again is a matter on which the whole industry should agree.

Transport.—Where the grower can deliver the fruit in his own vehicles to the markets the transport problem is simple. The growers of Kent and Middlesex delivered by motors a very large quantity of berries to the London markets, and smaller quantities were sent in this way from Hampshire, Wisbech and Cheddar. This method of transport achieved such successful results that it is possible to foresee that the motor will become, in the near future, a serious competitor of the railway for the transport of soft fruit.

The Railway Companies, though confronted this year with additional difficulties in consequence of the coal trouble, strove in a whole-hearted manner to cope with this seasonal and very difficult traffic, and generally gave satisfaction. The Great Western Railway Co. kept the Cheddar Valley supplied with an adequate supply of vans nicely fitted with shelves on which the baskets of ripe strawberries were placed. Incidentally here it might be mentioned that the Cheddar growers fasten four baskets together with a stick tied across the handles. The stick gives support to the frail basket and helps to keep it in place and affords valuable protection to the contents; further time is saved in packing the vans as a porter can by this means handle 8 baskets at a time. The South Western Railway Co. supplied to Hampshire a large number of vans also adequately and properly fitted with shelves, and fruit properly packed in these travelled without damage. From this district a few vans were sent off with the baskets packed on top of each other six or seven high in the van, with no shelves. The Company did this as an experiment, and they have expressed themselves satisfied with the result on the ground of costs saved. Judging, however, from the reports of growers and salesmen the fruit in the lower layers of baskets was very much damaged. Should the vans used for this traffic,

therefore, be fitted with shelves? The condition of the fruit on arrival at the market must be the deciding factor, and judging from this it appears that shelves are necessary.

The Ministry will continue to give consideration to this matter, and will strive to secure the best possible conditions.

The figures collected by the Ministry show that the approximate quantities of strawberries raised from the various producing centres were as follows :—

Tamar Valley	...	...	293 tons.
Cheddar	...	...	214 „
Hampshire	...	...	2,056 „
Wisbech Area	...	...	3,225 „

Large quantities were also sent from Middlesex, Kent, Hereford and other centres for which figures were not obtained. The total of all these figures is considerable, yet the supply this year was little more than sufficient to satisfy the demand for fresh fruit leaving very little for the jam manufacturers. The danger of over production is not yet in sight.

CONTROL OF "DAMPING OFF" AND "FOOT ROT" OF TOMATOES.

W. F. BEWLEY, D.Sc.,

Mycologist, Experimental and Research Station, Cheshunt, Herts.

IN a previous issue of this *Journal* (October, 1920) attention was drawn to the important disease known as "Damping off" and "Foot Rot" of tomatoes. The relation of its intensity to different cultural conditions was indicated and it was shown that it could be controlled by sterilising the soil, seedboxes and pots by means of heat or formaldehyde.

Many growers, however, do not find it convenient to adopt such methods, but rather desire some remedy which may be effectively employed to check the spread of the disease should it appear. As the result of continued investigation such a remedy has been found, which for convenience has been named "Cheshunt Compound."

Preparation of the "Cheshunt Compound."—The compound contains 2 oz. of Copper Sulphate and 11 oz. of Ammonium Carbonate. Powdered copper sulphate and ammonium carbonate should be obtained, reduced to a fine state by crushing out any lumps that may be present and then thoroughly mixed in the proportions given. Larger quantities may be prepared, so long as the proportions remain the same. The mixture may be stored in the dry state in an air-tight receptacle, but if left exposed to the air it gradually loses ammonia and becomes less potent.

Mixing the Solution.—The dry mixture should be stored for 24 hours in a tightly corked glass or stone jar before using. The solution is then prepared by dissolving 1 oz. of the dry mixture in a little hot water and making up to 2 gallons with water. The solution must not be put into vessels of iron, tin or zinc, as it would corrode them and lose its strength, and only just as much as is required for immediate use should be prepared.

Method of Use.—Plants which are already attacked receive no benefit from the solution but eventually die, unless the healthy tops are cut off above the diseased part and treated as cuttings. It is possible, however, to kill the infective organisms by watering infested soil with the solution, after which immediate planting may follow without in any way harming the plant. It is possible, also, to treat infected soil with plants *in situ*. The solution effectively destroys the disease organisms and at the same time increases the vigour of the plant. When the soil

is suspected of being infected the following methods should be adopted :—

(a) *Seed-boxes*.—The soil should be thoroughly watered with the solution after sowing and covering the seeds. Generally a pint per box (14 by 9 by 2 in.) is a suitable quantity to use.

(b) *Pots*.—The young seedlings should be planted and watering with the solution should follow immediately. To enable sufficient solution to be given to each plant, the level of soil should be one inch below the level of the pot. Care must be taken to treat the seedlings immediately after they have been placed in the infected soil. If left overnight before treatment, many will be infected and the treatment will be rendered useless.

(c) *Houses*.—Each plant should be removed as it is attacked, the hole watered with one pint of solution, a healthy plant inserted and watering with the solution should again take place.

The solution has a beneficial effect apart from killing the disease organisms, for the nitrogen which it contains imparts greater vigour to the young plants.

The treatment described above has proved of value against "Damping off" of many seedlings besides the tomato, but in the case of very delicate seedlings it is necessary for the solution to be more dilute. Preliminary experiments with the compound upon other root diseases have also proved satisfactory.

PROTECTION AGAINST FUNGI FROM ABROAD.

MRS. N. L. ALCOCK,

Pathological Laboratory, Ministry of Agriculture.

THE dispersal of newly-introduced fungi is a most interesting and still largely unexplored subject. Certain facts stand out, however, as to the extent and range of dissemination of disease. It is certain that in many cases extension has been checked by natural barriers when human factors have not intervened. The Chestnut Blight disease in New York was for ten years confined on its western boundary by a rough mountainous tract some thirty-five miles broad where no chestnuts grew; and with regard to White Pine Blister Rust, American pathologists are still hoping that it will not cross the Rocky Mountains.

In many cases it is possible to trace the human agency whereby the disastrous disease has entered in. In the natural course disease will pass, by spores borne by wind or animals or in other ways, over a distance of some ten miles. Very occasionally a jump is made, and an unexplained arrival appears a hundred miles from the nearest known source of infection—over continuous land; but crossing a vast expanse of sea or leaping over hundreds of miles unassisted by human transport in boat, train or wagon, apparently only occurs in the imaginations of early writers.

These facts lie at the root of the attempts now being made almost throughout the world to prevent the entrance of dangerous new parasites into clean areas. In England we have been exceedingly deliberate and have given much consideration to the matter, but the time has now certainly come to try to prevent further pests from entering the country. The new Destructive Insects and Pests Order of 1921 gives effect to the general opinion of experts and growers calling for legislative action.

As far as new fungi are concerned, England has little to fear from Europe, free intercommunication having introduced most species which will thrive in the country. The greatest danger is to be feared from new importations from the east or from America. Japan has now a Phytopathological Service and the enormous attention that the United States of America pays to the science of plant pathology and to the whole subject of the control of plant diseases is well known.

A sign of the times is the co-operation which is rapidly strengthening between plant pathologists in all parts of the

world, and as a result the assistance which these workers render, both to the welfare of their own countries and to those of others, is very hopeful. Invitations have been extended to European workers to visit important field conferences in America and an international phytopathological conference in Europe is being planned for 1922. Another hopeful sign is the increased interest given to Disease Surveys, every progressive country now endeavouring to draw up an accurate and yearly statement of the situation with regard to plant diseases. The Survey reports are invaluable, not only in showing how diseases are controlled in other countries, but in forming a basis for legislative measures.

In the northern part of the United States many crops are the same as our own and American experience shows us the urgent need of taking precautions against certain virulent diseases present there but absent in Britain. The four following are dealt with in the new Order:—

1. Chestnut Canker (*Endothia parasitica*).
2. Downy Mildew of Hops (*Peronosplasma humuli*).
3. Pear Blight (*Bacillus amylovorus*).
4. Black Knot of Plum and Cherry (*Plowrightia morbosa*).

The two other scheduled diseases, Wart Disease of Potatoes (*Synchytrium endobioticum*) and Onion and Leek Smut (*Urocystis cepulae*), are in a different category.

Wart Disease.—Wart Disease is here to our cost, but its distribution is known and the rules that are laid down for the entrance of potatoes from abroad are in accordance with the regulations that are laid down for its control in England. With the exception of new potatoes for immediate consumption it is required that they must be accompanied by a certificate stating that "Wart Disease has not occurred at the place where the potatoes were grown, nor within five hundred yards thereof."

Onion Smut.—The Smut disease of Onions and Leeks is at present very rare in England and "localised at a few centres." There is good reason to suppose that at least one of the recent new infections was introduced with foreign seed. At any rate it has been proved that this disease can be carried with the seed and therefore extra care is required. Onion Smut is common in America in many of the onion growing districts and is also present in Italy and France. The fungus acts as a soil parasite and remains in the soil for many years, attacking each successive sowing of onions or leeks.

Chestnut Blight.—At present it is possible to say that we have not seen a case of *Endothia parasitica* in England. Large

woods of Spanish Chestnuts are not usual in England, but the tree is grown extensively for coppicing for the production of hop and other poles.

The devastation caused by the Chestnut Blight in the United States is now well known. About 1904 a new bark disease was noticed on the Chestnut near New York. A few years later the losses caused by this one disease were estimated at £10,000,000 and have continued since; yet the parasite is practically harmless in China and Japan whence it came. Dr. W. A. Orton, one of the leading American pathologists, says that "Europe should take warning and exercise every precaution to prevent the introduction of this disease." *

In Pennsylvania some pathologists are now proposing to cut down every Chestnut tree in the state as "for the last fifteen years all efforts to control Blight have failed." †

The appearance of this disease is very characteristic. At first yellowish brown patches, slightly raised, stand out on the smooth healthy bark. Under these patches, if the bark be torn away, can be found the white, spreading fans of mycelium which form a distinctive diagnostic character. In damp weather the tendrils of spores push forth like so many thick buff-coloured or bright yellow hairs—they curl and twist and are soft when wet but hard and brittle when dry. We have other diseases in this country caused by fungi of the nearly allied families, but none so devastating in effect.

Downy Mildew of Hops.—The least known of the forbidden diseases is the Japanese Downy Mildew, *Peronoplasmopara humuli*. This was seen in Japan in 1905 when it spread rapidly over a hop field near Sapporo. It was found on the picturesque Japanese wild hop a few months later and was evidently native to Japan.

The leaves show small spots, angular at first, of a darker green than the rest of the leaf, and having a water-soaked appearance. Occasionally small blisters and bumps occur on the adjacent parts of the leaf. Gradually the colour deepens and then, with the death of the tissue, becomes dark brown and on the under surface a thick, downy growth forms which is white, but becomes greyish, resembling somewhat the fluffy growth of *Phytophthora* on the potato. This disease a few years later was found in the State of Wisconsin in various localities and evidently spreading.

Should this disease reach England and spread to the hop-

* Orton, *Phytopathology*. Vol. IV, No. 1, February, 1914.

† *Amer. Nut Journ.*, XII, p. 91, quoted in *Botanical Abstracts*, May, 1921.

gardens of Kent, what a field for mischief it would find! The damp climate of England would probably suit it, and the well nourished and well tended Kentish hews would, in all likelihood, furnish the most acceptable of hosts to that type of parasitic fungus.

Fire Blight.—The growing of susceptible pears in some parts of the United States, notably in southern New York State, is rendered unprofitable by the devastation caused by the Fire Blight, a bacterial disease due to the organism *Bacillus amylovorus*. Dr. H. H. Whetzel, the Professor of Plant Pathology in Cornell University, says "Fire Blight is the most universally destructive of all pomaceous fruit diseases." Dr. C. R. Orton may also be quoted as stating "The losses from Fire Blight run into millions of dollars in certain years in this country."

This disease occurs on Pears, Apples and Quinces. It is most destructive to young apple trees in the nursery and to older pear trees. There are four prevalent forms:—

(a) *Fire Blight* itself, which is a twig blight. The leaves, blackened as if by fire, cling to the blighted twigs. Sometimes only the apex is black, sometimes the destruction extends two or three feet back.

(b) *Blight Cankers* slightly sunken and blackened with a cracked rough edge delineating the morbid from the healthy tissue.

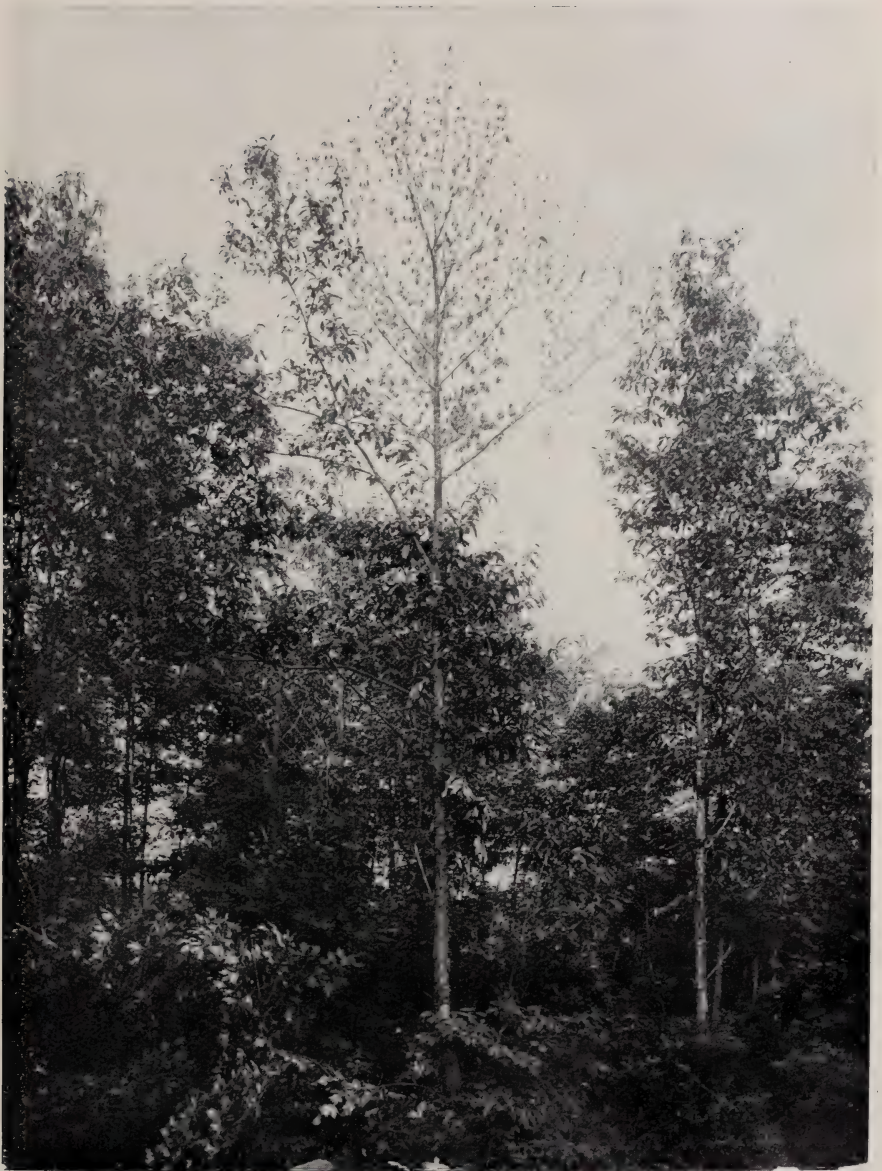
(c) *Blossom Blight* causes the flowers, dead and brown, to hang on the withered spurs.

From each there oozes, in wet weather, the sweetish, sticky, brownish-white fluid which bears the millions of bacteria.

(d) *Collar Blight*, the canker attacking the trunk of the tree, is particularly common on apples.

The appearance of the trees reminds one of an intensified attack of Blossom Wilt or Wither-tip, but the leaves are blacker, the flowers more scorched-looking, the effect more severe. A definite ooze is, moreover, usually present as drops on the diseased fruit or welling out from cracks in the twigs and diseased boughs.

Black Knot.—A disease which, like the Chestnut Blight, has so far never appeared in England, is the striking and unsightly Black Knot of Plum and Cherry (*Plowrightia morbosa*). This abounds on the wild plums and cherries in the United States of America, both on the native plums (including the tall Red Plums and the straggling Beach Plum a foot or so high) and on the introduced sloe or blackthorn, which is very common along the snake-fences and edges of the roads in New England. Cherries,



Photo]

[E. T. Kirk.

FIG. 1.—Chestnut Blight. Top of Chestnut Tree killed by the fungus *Endothia parasitica*. The dead leaves remaining on the tree are characteristic of the disease, they turn white and papery.



FIG. 2.

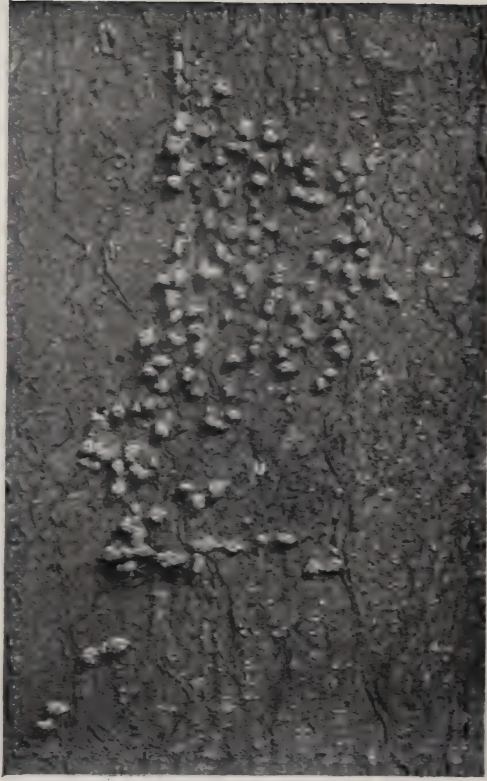


FIG. 3.

FIG. 2.—Chestnut Blight. Conidial Stage of *Endothia parasitica*. Cankers produced by artificial inoculations, the rings show size of canker at intervals of 4 weeks.

FIG. 3.—Chestnut Blight. Perithecial Stage of *Endothia parasitica*.



FIG. 4.—Black Knot of Plums. The early stage (left) is light-brown, the later perithecial stage is black and carbonaceous.



FIG. 5.—Fire Blight in Apple. Commencement of attack. The leaves die and turn black, and the branch may die back several feet.

of which there are two or three wild kinds, are also often distorted and injured by the black galls.

The knots occur sometimes at the end of twigs but more often on the smaller branches, where they grow most frequently along the branch in a slow spiral. Occasionally they entirely encircle the bough, forming a complete girdle, and the bough soon dies.

These black galls so check the nourishment of the branch on which they occur that the branch usually dies within a couple of years. The lumps or excrescences are light yellow-brown in the spring and early summer, turning black and charcoal-like in the autumn. The fungus produces spores of two kinds, a summer (conidial) spore from the light brown mass and a different winter (perithecial) spore from the knotty, black autumn stage.

These four diseases are of outstanding danger, but there are several other well-known diseases on fruit-trees, cereals and ornamental plants in various parts of the world which may, if introduced in the British Isles, become extremely troublesome, but which at present do not appear to warrant legislative action. They will, however, not be forgotten.

Another question is ever present which requires further research, namely, that of various strains in the same species of fungus. It is possible that different strains are concerned in the *Nectria* Canker and *Monilia* Brown Rot of Apples in America and in Europe and hence different results show in the two continents. It is possible also that the notorious *Stereum purpureum*, the cause of Silver Leaf in Europe, is not absolutely identical on both sides of the Atlantic and hence does not attack Plums in the United States and Canada as it does in Britain.

The Ministry is indebted to Professors H. H. Whetzel and M. F. Barrus of Cornell University for the photographs of Fire Blight and Black Knot of Plum and to Professor C. R. Orton for obtaining sanction from the Pennsylvania Chestnut Tree Blight Commission to use the photographs of Chestnut Blight accompanying this article.

LICENSING OF STALLIONS UNDER THE HORSE BREEDING ACT, 1918. SEASON 1921.

THE second year of the operation of the Horse Breeding Act, 1918, under which it is illegal to travel a stallion for service or to exhibit it on premises not in the occupation of its owner with a view to its use for service unless the horse is licensed, is now completed, and the Ministry is in a position to furnish information as to the results of the operation of the Act in England and Wales during the past season. The number of stallions licensed was 3,816 and 244 were refused (18 of the latter on appeal). Last year the comparative numbers were 3,749 and 404 respectively, and it will be noted, therefore, that there has been a small increase in the number of licensed stallions this season and a considerable decrease in the number of refusals. Of the 3,816 licensed stallions 3,418 were pedigree animals and the remaining 398 were horses that were not entered or accepted for entry in any recognised stud book.

As will be seen from the Table annexed, 2,316 or 68 per cent. of the pedigree stallions licensed, were of the Shire Breed, good evidence of the popularity of this breed.

The following diseases or defects are prescribed in the Regulations of 1919 for England and Wales, made under the Act, as rendering a stallion unsuitable for the service of mares, namely:—Cataract, roaring, whistling, ringbone (high or low), sidebone, bone-spavin, navicular disease, shivering, stringhalt, and defective genital organs. The Table hereunder gives the number of each breed or type of stallion in respect of which licences have been refused and the diseases or defects with which the animals were affected. It will be noted that the most common diseases on account of which stallions were refused licences were whistling, roaring and sidebone, which account for 124 refusals out of a total of 244.

Appeals were lodged against refusals of licences in 44 cases and 26 of them were successful.

During the travelling season the Ministry's Inspectors were instructed to stop stallions they met on the road and to require the production of the licences, and it is satisfactory to be able to report that in only comparatively few instances were the stallions unaccompanied by their licences and only in seven instances were the stallions unlicensed. Failure to comply with the Regu-

TABLE II.

BREED.	No. ex- amined.	No. refused.	Per- centage of refusals.	REASONS FOR REFUSAL.									
				Whist- ling.	Roaring.	Side- bone.	Cataract.	Ring- bone.	Bone Spavin.	Shiver- ing	Defec- tive Genital Organs.	String- halt.	General Unsuit- ability.
Pedigree.													
Shire ...	2,483	167	6.73	52	40	32	18	6	5	7	1	—	6
Clydesdale ...	281	15	5.34	2	4	4	—	1	1	—	1	1	1
Suffolk ...	252	17	6.74	5	1	3	—	4	1	—	2	1	—
Percheron ...	41	3	7.32	2	—	—	—	—	—	—	—	1	—
Hackney ...	201	10	4.97	3	—	—	2	—	1	—	2	2	—
Thoroughbred ...	168	7	4.16	2	—	—	2	1	1	—	—	1	—
W. Roadster ...	4	1	25.00	—	—	—	1	—	—	—	—	—	—
W. Cob ...	72	2	2.77	1	—	1	—	—	—	—	—	—	—
Non-Pedigree.													
Heavy ...	263	19	7.22	1	3	6	3	3	3	—	—	—	—
Pony and Cob ...	68	3	4.41	1	—	1	—	—	1	—	—	—	—
Totals of Refusals	—	244	—	69	48	47	26	15	13	7	6	6	7

lations was also reported to the Ministry by the Police, who took proceedings for offences under the Act and in the great majority of cases convictions were obtained.

It is evident from the working of the Act during the second year of its operation that the necessity of having stallions licensed and of the licences being carried by the grooms when leading the stallions is now generally recognised, and the plea of ignorance, which was so common last year, was but seldom made during the past season.

It is of course premature at present to expect any good results to be noticeable from the operation of the Horse Breeding Act, but the Ministry has evidence that owners of licensed stallions no longer suffer as they used to do from the competition of the unsound stallion whose chief qualification, in the estimation of the careless and ignorant farmer, was the cheap fee at which it travelled, and the clearance of such stallions from the road must in course of time secure improvement in the Horse Breeding Industry.

It should be added that licences issued for the licensing year 1921 will expire on the 31st October, 1921, and should be returned to the Ministry as soon as possible after that date. Failure to comply with this requirement renders an owner liable to a fine not exceeding £5. From the 1st November, 1921, applications may be made for licences for the year ending 31st October, 1922, and as the Ministry cannot undertake to examine stallions at short notice, owners are advised to send in their applications at the earliest possible date. If many defer doing so till the service season approaches it will not be possible to deal with all applications before the season actually commences.

It should also be noted by owners of pony stallions, that an alteration has been made in the Regulations, whereby the licence fee will henceforth be one guinea, no reduction being made as hitherto in favour of pedigree stallions not exceeding 15 hands in height.

NOTES ON MANURES FOR OCTOBER.

E. J. RUSSELL, D.Sc., F.R.S.,

Rothamsted Experimental Station.

Effect of the Drought on Fertilisers in the Soil.—In a season so exceptional as the one now drawing to a close there has necessarily been much experience with fertilisers that was wholly unexpected. In many cases land was well manured for roots, but no roots grew; elsewhere much fertiliser has been put on grass land with no effect. The question therefore arises, to what extent can fertilisers added to the soil in seasons such as the present be relied upon for next year's crops?

There is abundant evidence to show that *Potash* and *Phosphates* remain unchanged during a dry season, and they will therefore come in perfectly well for succeeding crops in the rotation: no loss need be feared. The fertiliser added has not been wasted, but is simply lying where it can be taken up by the plant. This holds true of sulphate of potash, muriate of potash, kainit, superphosphate, basic slag, mineral phosphates and bone manures.

Nitrogenous manures, however, are liable to behave differently. Some of them have probably been taken up by the crop, and, if so, they cannot of course be expected to act in the soil again. Cases have come to the writer's notice where a quick-acting nitrate was taken up by the grass crop, as shown by the dark green colour and additional growth of the herbage; while the slower acting nitrolim was not taken up, but lay on the soil unchanged. Nitrogenous manures left thus unabsorbed will probably change rapidly to nitrates when the soil becomes sufficiently wet, and they may then be taken by a crop, or washed out of the soil; but they are not likely to be left unchanged in the soil. So much depends on local conditions that it is difficult to lay down general rules; the following, however, will probably not be far wrong:—

1. On grass land intended for hay the nitrogenous manure will probably remain effective for the coming season. It has happened after a great drought that heavy rain was followed by an unusually copious growth of grass.

2. On arable land intended for winter corn the nitrogenous manure may also remain effective, especially in view of the fact that work is well forward and sowing is likely to be early.

3. On arable land intended for roots or spring corn, on the other hand, the nitrogenous manure may suffer considerable loss. It is likely to change into nitrates rapidly if it is not already in that form, and then it is liable to be washed out of the soil. If the winter should be wet there will be just as much need for nitrogenous manure next spring as if this season had been an ordinary one. This statement, however, does not apply to potash and phosphates, which are not liable to be washed out, except perhaps from very light sandy soils under heavy rainfall.

The Quantity of Fertiliser to use on the Farm.—In endeavouring to work out the fertiliser requirements of the farm it is safe to assume :—

1. That sufficient of the manure applied for roots and potatoes will remain over for winter corn, so that nothing need be given unless the winter turns out very wet, when a spring dressing of sulphate of ammonia or nitrate of soda will be required ;

2. That winter corn following a previous corn crop is not likely to want much fertiliser where it has been possible to plough or broadshare the stubbles and so let in the sunshine and the air ;

3. That spring corn will want its usual fertiliser treatment unless the winter is very dry ;

4. That roots will require the usual quantity of fertiliser. .

Treatment of Clover.—At the present time the condition of the young clover is very unsatisfactory, and many leys are already lost. A certain amount of mending is possible, and trefoil may be sown. Where the young plant still survives and there has been sufficient rain to ensure that it will grow it may be helped on heavy soils by a dressing of basic slag, about 4 cwt. to the acre : on light soils kainit at the rate of 3 cwt. or 4 cwt. to the acre may be used instead. No fertiliser treatment will help, however, when the plant is too far gone, or where the soil still remains dry. If it is decided to continue the old leys for another year this manurial treatment should certainly be given. If it becomes necessary to plough them up and sow barley, the phosphate or potash will serve a very useful purpose for this crop, and probably be all that is necessary.

Chalk or Lime on the Land.—At Rothamsted we probably receive more letters from farmers about lime, limestone or chalk

than about any other single subject. It is evident from their inquiries and from our own observation in the country that liming is still one of the farmers' big problems. It is very desirable that new sources of supply should be opened out and that old limestone or chalk quarries and limekilns should be examined with a view to restarting. There is often a fear that the local limestone is not good agricultural lime. It may not be the best obtainable, but it may be the cheapest because of the saving in transport charges. County authorities, Farm Institutes and Farmers' Clubs who are desirous of making some useful field trials could very well explore the local supplies of limestone and lay out the following test:—

- Plot 1.—2 tons per acre local limestone.
- „ 2.—2 tons per acre ground limestone of recognised good quality.
- „ 3.—10 to 15 cwt. per acre local burnt lime.

The information would be valuable, enabling a farmer to decide whether he can use local lime or limestone, or whether it will be more profitable to him to go further afield and purchase a recognised good quality limestone at a higher price.

Neutral Sulphate of Ammonia and Acid Sulphate of Ammonia.—A correspondent inquires what is the difference between these two fertilisers and whether one has any advantage over the other. The ordinary pre-war and wartime sulphate of ammonia was always slightly acid, but in recent years a modification in the method of manufacture has been introduced which gives a product having an acidity which is so slight as to be negligible; it is always less than 0.02 per cent. and sometimes only about 0.01 per cent. This is called “neutral” sulphate of ammonia, and it has several advantages over the ordinary “acid” product because:—

- a. It is often in smaller crystals and can therefore be more evenly distributed by the machine.
- b. It does not cake and therefore does not require to be broken up before use.
- c. It is not wet.

These advantages would ensure that a farmer would always take the “neutral” product if he could obtain it. The process, however, is not yet widely adopted by gas works and other makers, and until it becomes more general many farmers must perforce use the old “acid” material.

Composition of Purchased Manures.—A correspondent asks for the composition of the ordinary purchased manures. The information is given in the table below:—

Percentage Composition of Ordinary Purchased Manures.

				<i>Nitrogen</i> (N).	<i>Phosphoric</i> <i>acid</i> (P_2O_5).	Equal to Phosphate $Ca_3(PO_4)_2$.	<i>Potash.</i> (K_2O).
Nitrate of ammonia	...	...	...	34.8			
Nitrate of soda	...	...	...	15.5			
Nitrate of lime	...	...	...	13			
Sulphate of ammonia	...	...	...	20-20.4			
Nitrolim	...	...	...	14.5-15			
Superphosphate (soluble only)					11.5	26	
					13.6	30	
					16.0	35	
Basic slag	...	...	...		19.1	42	
					15.5	34	
					9.1	20	
Raw bones	...	...	...	5	22	48	
Bone meal	...	...	...	3.5-4.5	20-25	43-55	
„ „ (a usual analysis)	...	...	...	3.75	20.6	45	
Steamed bone flour	...	...	...	1-2	25-32	55-69	
Dissolved bones	...	...	...	2-3	15-16	33-35	
Sulphate of potash	...	...	...				48.5
Muriate of potash (pre-war usual quality)	...	...	...				45
„ „ (now obtainable)	...	...	...				50-60
Kainit (pre-war, usual quality)	...	...	...				12.5
Sylvinit (French Kainit)	...	...	...				14-16
Rape cake	...	...	...	5	2	4	1
Ashpit refuse, variable, about	...	...	...	0.5	0.5	1	2
Sewage sludge, variable, about	...	...	...	1	1	2	
„ „ (activated)	...	...	...	6	4	9	
Fish meal	...	...	...	8-10	4.5-9	10-20	1
Phosphate guano	...	...	...	5-8	14-18	30-40	

NOTES ON FEEDING STUFFS FOR OCTOBER.

E. T. HALNAN, M.A., Dip. Agric. (Cantab.).

Ministry of Agriculture and Fisheries.

IN making up a ration for fattening animals two considerations are necessary: (1) an adequate well-balanced ration for the purpose in view must be given, and (2) the materials used must be so adjusted as to give a carcass to meet the butcher's approval. Not sufficient attention is generally paid to the necessity of producing a carcass suitable for slaughter, the chief fault being the production of unsuitable fat. It may, therefore, be of advantage to discuss briefly the type of carcass required by the butcher.

In the case of cattle the natural tendency of the beast is to produce a hard, tallowy fat; in the case of the pig, on the other hand, the natural tendency is to produce a fat of oily consistency. The objects of the feeder, therefore, are different in these two cases. In feeding pigs, foods should be given which tend to harden the fat; in fattening cattle, foods having a tendency to soften the fat should be given. Experiments have shown that the nature of the fat in the animal can be altered to a considerable extent by the nature of the food fed. In an experiment with fattening lambs, in which, in addition to the basal ration, maize and sunflower seed cake were fed to the one lot, and crushed peas and wheat husks to the other, the sunflower seed cake and maize lot produced an excellent quality of meat with soft fat, whereas the crushed peas lot gave a very poor carcass, the fat being hard and crumbly.

Summing up the results of experiments of this nature, and also of practical experience, it is possible to say that both pigs and cattle yield harder bacon or fat when they are fed on grains rich in starch and poor in oil, such as rye, barley, peas, beans and lentils. The same effect is produced by the use of potatoes, mangolds, and palm nut and coconut cakes. A soft and rather oily fat is obtained from the use of sunflower seed cake, linseed cake, rape cake, rye, peas, maize, wheat bran, oats, and fish and meat meals rich in fat. In making up a ration for bacon pigs or for cattle these points should be taken into consideration where the feeder wishes to get a good market for his produce.

One other point arises: in feeding all animals on foods containing oil or fat care should be taken, if the best results are wished

NAME.	Cost.		Cost per Ton.	Manurial Value per Ton.	Cost of Food Value per Ton.	Starch Equiv. per 100 lb.	Price per Unit, Starch Equiv.	Price per lb. Starch Equiv.
	s.	lb.	£ s.	£ s.	£ s.		s.	d.
Barley, English Feeding	50/0	400	14 0	1 6	12 14	71	3/7	1·92
" Canadian "	47/-	400	13 3	1 6	11 17	71	3/4	1·78
Oats, English White "	38/-	336	12 13	1 9	11 4	59·5	3/1	2·01
" " Grey & Black	34/-	336	11 7	1 9	9 18	59·5	3/1	1·78
" Canadian "	35/6	320	12 8	1 9	10 19	59·5	3/8	1·96
" Argentine "	31/3	320	10 19	1 9	9 10	59·5	3/2	1·70
Maize, Argentine	41/6	480	9 14	1 5	8 9	81	2·1	1·12
Beans, English winter	55/-	532	11 12	3 1	8 11	66	2/7	1·38
" Rangoon "	16/6	112	16 10	3 1	13 9	66	4/1	2·19
Peas, English blue	110/-	504	24 9	2 13	21 16	69	6/4	3·39
" " dun	69/-	504	15 7	2 13	12 14	69	3 8	1·96
" " maple	98/-	504	21 16	2 13	19 3	69	5/7	2·99
Rye, English	56/-	480	13 1	1 8	11 13	72	3/3	1·74
Millers' offals—Bran	—	—	10 5	2 10	7 15	45	3/5	1·83
" " Coarse middlings	—	—	13 5	2 10	10 15	64	3/4	1·78
Oat Husks* - - -	—	—	3 15*	—	—	—	—	—
Rice Bran* - - -	—	—	9 10*	—	—	—	—	—
Barley meal - - -	—	—	16 10	1 6	15 4	71	4/3	2·28
Maize " - - -	—	—	11 10	1 5	10 5	81	2/6	1·34
Fish " - - -	—	—	19 10	7 12	11 18	53	4/6	2·41
Linseed - - -	—	—	23 0	2 16	20 4	119	3/5	1·83
" Cake, English	—	—	16 5	3 12	12 13	74	3/5	1·83
Cottonseed " - -	—	—	11 2	3 5	7 17	42	3/9	2·01
" " Egyptian	—	—	11 0	3 5	7 15	42	3/8	1·96
" " decorticated	—	—	15 10*	5 6	10 4	71	2/10	1·52
" Meal, decorticated	—	—	14 15	5 6	9 9	71	2/8	1·43
Coconut cake - -	—	—	14 12	3 0	11 12	79	2/11	1·56
Groundnut cake -	—	—	12 5	3 9	8 16	57	3/	1·65
Palm kernel cake -	—	—	12 10	2 1	10 9	75	2/9	1·47
Brewers' grains, dried, ale	—	—	10 0	2 7	7 13	49	3/1	1·65
" " porter	—	—	9 0	2 7	6 13	49	2/9	1·47
" " wet, ale	—	—	1 17	0 12	1 5	15	1/8	0·89
" " wet, porter	—	—	1 10	0 12	0 18	15	1/2	0·62
Malt culms - - -	—	—	8 0	3 6	4 14	43	2/2	1·16
Potatoes † - - -	—	—	2 5	0 8	1 17	18	2/1	1·12
Swedes † - - -	—	—	1 2	0 5	0 17	7	2/1	1·12
Mangolds † - - -	—	—	0 18	0 6	0 12	6	2/1	1·12
Vetch and Oat Silage †	—	—	2 4	0 15	1 9	14	2/1	1·12

* Prices at Liverpool.

† Farm value.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of August and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative prices of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, suppose palm kernel cake is offered locally at £10 per ton. Its manurial value is £2 1s. per ton. The food value per ton is therefore £7 19s. per ton. Dividing this figure by 75, the starch equivalent of palm kernel cake as given in the table, the cost per unit of starch equivalent is 2s. 1d. Dividing this again by 22·4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1·11d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own market.

for, to restrict the amount of oil fed in the ration to about 1 lb. per thousand pounds body weight in the case of cattle, and up to, but not exceeding, 2 lb. per thousand pounds body weight in the case of pigs.

In next month's notes it is proposed to deal with winter rations for pigs, dairy cattle, fattening cattle and horses, suitable for farms on which a shortage of roots has been experienced this year. The writer would welcome any suggestions from readers who have already overcome this difficulty.

Rabies.—No outbreak of Rabies has occurred since the issue of the September *Journal*.

Salisbury and Southampton.—A considerable modification of the area under restrictions in connection with the outbreaks in this district was made as from 31st August, the eastern portion of Hampshire within the district being excluded from that date. The inner controlled areas are still maintained around Salisbury and Southampton.

Foot-and-Mouth Disease.—There has been no development of Foot-and-Mouth Disease in the Stoke-on-Trent district, nor has the disease been confirmed in any other part of Great Britain. All general restrictions in connection with the outbreaks on 10th and 11th August were withdrawn as from 8th September.

Leaflets issued by the Ministry.—Since the date of the last list given on page 576 of the September issue of the *Journal*, two new leaflets have been published :—

No. 373.—Mosaic Disease of Potatoes.

„ 379.—Nauru Phosphate.

The following leaflets have been revised and brought up to date :—

No. 96.—Milk Fever or Parturient Apoplexy.

„ 187.—The Selection and Milking of Dairy Cows.

„ 192.—Farm Buttermaking.

„ 309.—Suggestions to Allotment Holders for Autumn Treatment of Land.

„ 337.—Cheddar Cheese.

„ 353.—Winter Oats.

The following leaflet has been amended :—

No. 15.—The Apple Blossom Weevil.

The following leaflets have been withdrawn :—

No. 260.—Statistics of Agricultural Co-operative Credit Societies in England and Wales.

F.P. 47.—The Testing of Seeds Order, 1918.

Seed Potatoes from Scotland and Ireland.—The Ministry desires to remind persons in England and Wales who propose to obtain “seed” potatoes direct from Scotland during the coming season that the regulations governing such importations which were in force last year are still in operation; and further, that since 1st September, 1921, similar regulations apply to “seed”

potatoes imported from Ireland. These regulations are, briefly, that all "seed" potatoes imported from Scotland or Ireland must be accompanied by one or other of two prescribed declarations, and any person receiving from either of these countries any "seed" potatoes which are not accompanied by a declaration must report the fact to the Ministry within 7 days of receipt of the potatoes and refrain from moving or disposing of the potatoes until he has obtained permission from the Ministry. The declaration required is :—

(a) In the case of "seed" potatoes of varieties approved as immune from Wart Disease certified whilst growing by the Scottish Board or by the Irish Department of Agriculture :—a declaration by the consignor correctly stating the serial number of the relative certificate of purity ;

(b) In the case of all other "seed" potatoes :—a declaration by the consignor correctly stating the reference number of the certificate issued not more than 9 months previously by the Scottish Board or by the Irish Department of Agriculture, certifying, in the case of Scotland, that Wart Disease has not occurred on, nor within one mile of the land on which the potatoes were grown, or, in the case of Ireland, that Wart Disease has not occurred in the locality in which the potatoes were grown.*

Importation of Plants, Bulbs, &c.—Importers of plants, bulbs, &c., from countries outside the United Kingdom and the Channel Islands should be aware of the requirements of the Order of the Ministry which comes into operation on 1st October next.* They should also bring them to the early notice of those abroad who send them plants, bulbs, &c. The Order applies to all living plants with a persistent woody stem above ground, and parts of the same used for propagation except seeds ; all potatoes ; all tubers, bulbs, rhizomes, corms, and hop stocks for planting ; seeds of onions and leeks for sowing ; and gooseberries. The Order requires that every consignment of these plants, or parts of them, destined for England and Wales, shall be inspected in the country of origin and certified by a duly authorised official of that country not more than 30 days prior to shipment as being generally healthy and free from the pests scheduled in the Order. In the case of potatoes, other than new potatoes, the certificate must also declare that Wart Disease has not occurred on the place where the potatoes were grown, nor within 500 yards thereof (approximately $\frac{1}{2}$ kilometre). New potatoes, that is potatoes landed in this country on or before 31st July in the year in which they have been lifted, must be accompanied by a declaration in writing to the effect that they have been lifted in the same year.

When sending a consignment, the consignor should despatch the original certificate with information as to the number of packages, nature of plants or parts thereof, name of vessel, port of entry and approximate date of arrival, to the Horticulture Division of the Ministry of Agriculture, 4, Whitehall Place, London, S.W. 1. He should affix a copy of the certificate to each package of the consignment, which must also be clearly labelled as to the nature of the plants or parts thereof in it. This label may be a part of the copy certificate.

* Copies of the Wart Disease of Potatoes (Imported Scottish Seed Potatoes) Order of 1920, the Wart Disease of Potatoes (Imported Irish Seed Potatoes) Order of 1921, price 1d. net each, and the Destructive Insects and Pests Order of 1921 (S.R. and O., 1921, No. 931), price 2d. net, may be purchased through any bookseller or direct from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.2.

If a consignment or package arriving in England and Wales is so certified and labelled, it will be admitted without delay. If, however, it is not accompanied by the certificate it will be detained on arrival at the port of entry and will not be delivered to the consignee until it has been examined and passed by an Inspector of the Ministry. Should any consignment be found on arrival to be diseased within the meaning of the Order, it will only be delivered to the consignee after disinfection or other necessary treatment has been carried out at the expense of the importer. If such disinfection or treatment is not carried out, the consignment must either be destroyed or returned to the country of export by the importer. It will be observed, therefore, that failure to comply with the requirements of the Order will necessitate delay in delivery, and may lead to refusal of entry.

Importation of Rhododendrons.—Some misunderstanding appears to exist as to the effect of the new Orders issued by the Ministry, dealing with the importation and sale of plants, &c. (The Destructive Insects and Pests Order of 1921, and The Sale of Diseased Plants Order of 1921). Nurserymen point out that the Rhododendron Fly, a pest serious on Rhododendrons in certain countries, is scheduled under the Sale of Diseased Plants Order, and that therefore they are prevented from selling in this country plants which are substantially attacked by this pest. This is correct, but the conclusion has been drawn that, since the pest is not scheduled under the Destructive Insects and Pests Order of 1921, which relates to imported plants, Rhododendrons badly attacked by the Fly will be allowed to enter the country freely. Such, however, is not the case.

A careful reading of the Destructive Insects and Pests Order of 1921 will show that Rhododendrons sent to this country must be accompanied by a Health Certificate, signed by an official of the country of origin, to the effect that the plants are perfectly free from the pests mentioned in the Order, and also that they are "healthy." In paragraph 5 of the Third Schedule of the Order, it is laid down that plants will not be deemed to be "healthy" if attacked by any of the pests mentioned in the Sale of Diseased Plants Order of 1921. It is therefore clear that the Health Certificate accompanying imported plants goes very much farther than a Certificate of Freedom from the specific pests mentioned in the Second Schedule to the Destructive Insects and Pests Order, since it must also declare that the plants are healthy in general, and particularly with regard to the pests mentioned in the Sale of Diseased Plants Order.

The FARMERS' "WARDEN"

FOR INSURANCE OF
HORSES and CATTLE.
STALLIONS, BROOD MARES,
FOALS.



EMPLOYERS' LIABILITY.
FIRE. DRIVERS' ACCIDENTS.
MOTOR CARS, FARM TRACTORS,
and GENERAL INDEMNITIES.

For Best Rates and Terms apply—

WARDEN
INSURANCE COMPANY, LTD.

ESTABLISHED 1875.

Honoured with the Patronage of H.M. THE KING.

Chief Office—21, IRONMONGER LANE, LONDON, E.C. 2.

MANAGER AND SECRETARY: R. R. WILSON.

"Cook's"
Fertilizers
FOR ALL CROPS.

Use Pure Bone Meal and Pure Crushed
Hoofs for Autumn Sown Wheat and
Winter Dressings of Green Stuffs.

EDWARD COOK & CO., LTD., **Bow, London, E.3.**

BREEDERS' ANNOUNCEMENTS.

CATTLE.

ABERDEEN-ANGUS.

MACAINSH, JOHN, Congash, Grantown-on-Spey, N.B.—Pure-bred Aberdeen-Angus Cattle.—Particulars on application.

DEVONS.

STANTON, HARWICH.—REGISTERED HERD RED DEVON DAIRY CATTLE. Devons are the best English Dairy Cattle under all conditions and in any climate.

FRIESIANS.

GILSTON PARK HERD OF PEDIGREE BRITISH FRIESIANS, property of A. S. BOWLBY, Esq. Bulls and Bull Calves generally for sale, by imported and other leading sires.—Apply Captain S. E. BUCKLEY, M.C., Gilston Park Estate Office, Harlow, Essex.

ROUGH HERD OF BRITISH FRIESIANS is the herd for production, colour, size, milk and butter-fat. The herd to buy your next bull calf sired by Routh Victory, third prize Dairy Show, 1920, weighing 13½ cwt. at 20 months old, whose dam gave 2,268 gallons, butter-fat 4 66; the only cow in the kingdom to produce 1,200 lb. of butter in 365 days. Inspection invited.—P. FORD, Molescroft, Beverley.

SHORTHORNS.

WELBECK HERD OF PEDIGREE SHORTHORNS, the property of the Duke of PORTLAND, K.G. Young Bulls and Heifers for sale, from the best strains.—Apply, ALEX. GALBRAITH, Norton, Cuckney, Mansfield.

DAIRY SHORTHORNS.

PLAYFORD HERD OF PEDIGREE DAIRY SHORTHORNS. Deep-Milking Strains of robust constitution. Bulls in service: Thornby Don (133918), Hermit II. (120697). Milk records kept, inspected by Dairy Shorthorn Association and Ministry of Agriculture Recorder. Young Bulls and Bull Calves for sale. Also Breeder of Pedigree Suffolk Sheep and Large Black Pigs.—S. R. SHERWOOD, Playford, Ipswich.

CHIVERS & SONS, LTD., HISTON, CAMBS.—Pedigree Dairy Shorthorn Herd, numbers over 100 head, mainly composed of Bates and other old English Families. Winners at the Royal and leading Shows. Daily Milk records checked by D.S.A. and Ministry of Agriculture Recorders. Young Bulls from recorded cows always for sale.

LINCOLN RED SHORTHORNS.

THE STAPLEFORD PARK HERD. A few young Bulls from Royal Prize Winners always for sale from carefully tested milking strains only. Apply C. S. Harvey, Wymondham, Oakham.

FARMING

LEARN BY POST

TO make farming pay really well. We have trained hundreds to succeed. Why not you?

WE have courses of instruction in every branch of Mixed, Stock, Arable and Dairy Farming, Veterinary Science, Farm Accounts, &c.

ALSO a special course in Land Agency for those going in for the management of landed estates.

THE College has been established 18 years. Send postcard for a free prospectus to The Agricultural Correspondence College (Sec. N), Ripon.

FARMING

THE YORKSHIRE INSURANCE COMPANY Limited.

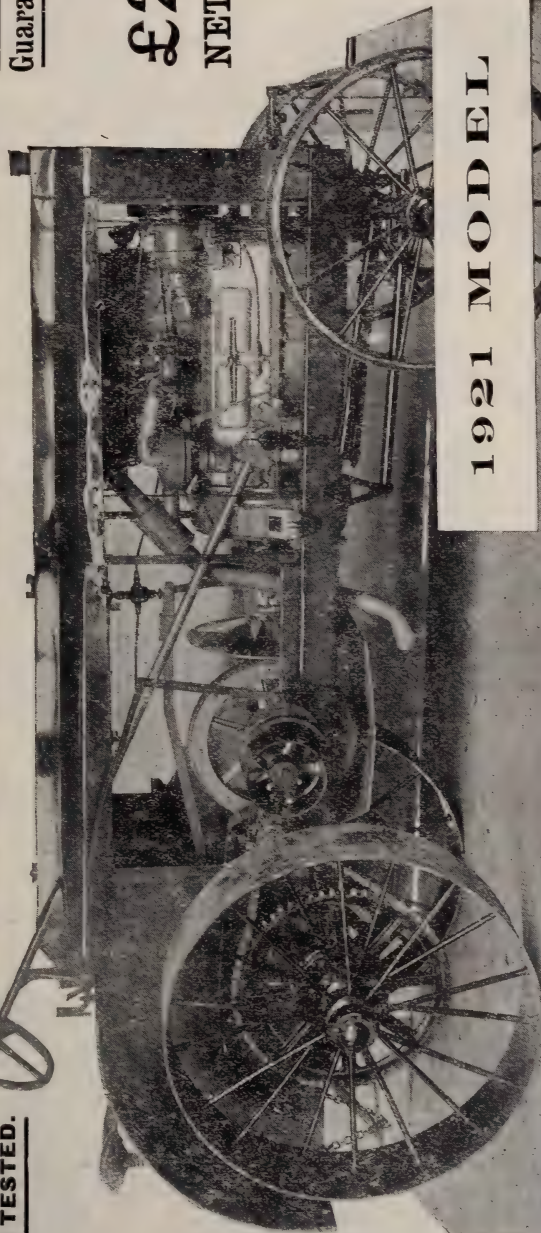
FARMERS' INTERESTS SPECIALLY STUDIED.
Have you increased your FIRE INSURANCE
on New Crops to meet present day values?
If not, consult the "Yorkshire."

Chief Offices:

York: ST. HELEN'S SQUARE.

London: BANK BUILDINGS, PRINCES ST., E.C.2.

Branches and Agencies throughout the Kingdom.

FARM TRIED.TIME TESTED.Suitable for any Plough.
30 H.P.**ELGIN**Immediate
DeliveryGuaranteed.**£200**
NET CASH**1921 MODEL****FOOL PROOF.****Now in its Seventh Year.***Some reasons why the ELGIN is the World's Greatest All-Purpose Power Plant for the Farm:***FRICITION DRIVE. NO GEARS.**

Weight of Tractor, 3,300 lbs. Four cylinder. Giving long life and steady flow of power. Five speeds—forward and one reverse. Starts easily—no batteries—runs on magneto. Simplest construction—fewer parts than in other tractors. Very easy to get at. Suitable for Belt and Haulage Work.

*For further particulars apply to the Sole Sellers,***F. S. CANDELIN & CO., 7/8, Norfolk Street, Strand, London, W.C.2.**

Telephone (2 lines): CITY 5482 & 5483.

CATTLE—continued.

KERRY AND DEXTERS.

PALMER, R. E. Pure Pedigree Kerry Cattle, Oaklands Park, Newdigate, Surrey.

HEREFORDS.

WHITE, W. J. S., ZEALS, WILTS.—Old-established Herd of Milking Herefords, Bulls and Calves, for Sale.

SHEEP.

OXFORD DOWN.

AKERS & CO., BLACK BOURTON, OXON.—Registered Oxford Downs, Rams and Ewe Lambs on Sale; inspection invited.

LINCOLN LONGWOOL.

HOYLES, GEO., SKIDBY MANOR, near HULL.—Pure Lincoln Longwool Sheep; true type, sound conditions, lustrous long wool, give satisfaction at home and abroad.

PIGS.

BERKSHIRE.

MANUDEN HERD OF BERKSHIRES. Gilts 11 months by Steadfast (brother to Carry On, Royal Champion, 1919), in pig to Hammond Haymaker, 1st., Oxford, 1920. 20 gns., carriage paid.—GEE, Manuden House, Essex.

LARGE WHITE.

OHIVERS & SONS, LTD., HISTON, CAMBS.—Over 1,000 pigs bred annually. Breeding Stock live out in Large Grass Orchards. Stock Boars include Histon Thor, Champion Peterborough and Suffolk 1920, Histon Lion Heart, Champion Royal Norfolk 1919, Dalmeny Macbeth, 1st Highland and Edinburgh 1920, and own brother to 720-guinea Sow. Young Stock always for Sale.

COLSTON & BORROWFIELD HERDS OF LARGE WHITE PIGS, the property of R. Millington Knowles, Esq., The Hall, Colston Bassett, Notts.—Numbers and quality equal to pre-war standard.—Particulars from AGENT, Estate Office, Colston Bassett, Notts.

DENNY, E. H. M., STAPLEFIELD PLACE, STAPLEFIELD, SUSSEX.—Large White Yorkshire Pedigree Pigs. Station: Haywards Heath. Telegrams: Handcross.

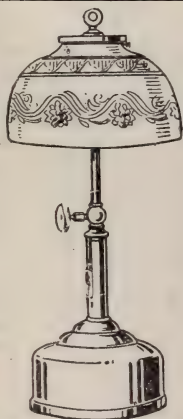
GREENALL, SIR GILBERT, BART., C.V.O., WALTON HALL, WARRINGTON. The Walton and Worsley Herd of Pedigree Large White Pigs. Selections of all ages for sale at moderate prices. Apply to the Manager, The Office, Bridge House, Higher-Walton, Warrington. Station: Warrington. Trains met by appointment.

THE WARREN HERD OF PEDIGREE LARGE WHITE PIGS, the property of H. T. Williams, Esq.—Young Stock of the best strains for Sale, including a fine selection of in-pig Gilts.—Apply to **RAYMOND KEER, Warren Home Farm, Broughton, Chester.**

MIDDLE WHITE.

OHIVERS, JOHN, HISTON, CAMBS.—Pedigree Middle White Pigs. Breeding stock live out in Grass Orchards. Wins 1920 included Champion Boar, Champion Sow, and Cup for Best Middle White Pig, won outright (second year in succession) R.A.S.E. Show, Darlington. Young Stock for Sale.

EDGE, S. F., GALLOPS HOMESTEAD, DITCHLING, SUSSEX.—Albany Herd of Pedigree Middle Whites. Bred on open air system. Wonderful doers and breeders. Will thrive anywhere.



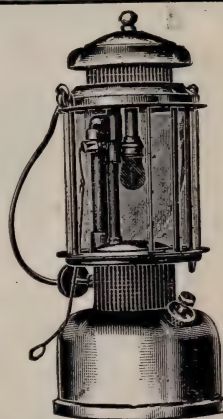
No 210 Table Lamp

400 C. P. VAPOR LAMPS
THAT CAN BE TURNED DOWN TO
ANY DESIRED SMALLER C. P.

Safety and satisfaction guaranteed. They burn 95% Air and 5% Petrol Vapor. They are clean and economical. They cost 1d. per hour to run, and at one filling will run a week. The principle in both lamps shown is that applied to a lamp supplied to the U.S.A. Government. Large stocks of both types are on our premises, and we can supply by return. The cost is 60s. each packed and delivered. The Mantles are durable, and the Lantern is storm proof. Everybody who introduces six buyers gets his money back. The Lamps are made of the very best and strongest materials, and are finished in highly-polished nickel. The Light given is twenty times that of the largest oil lamps. Both Lamps are fitted with Automatic Tip Cleaner, and they are the Lamps that never fail. Every Lamp is tested before it reaches user's hands.

Suppliers:
STANLEYS (STRATFORD), LTD., Wharton Rd., London, E.15.

Please mention "Journal of the Ministry of Agriculture."



Storm Proof Lantern,

NEW SKINS FOR YOUR ROOFS

Tesco

THE ORIGINAL PLASTIC COMPOUND

for Repairing

All Leaky Roofs

Easily applied with a TROWEL.

Also made in SEMI-PLASTIC FORM for applying with
a BRUSH.



*Sticks
anywhere.*

*Descriptive Booklet sent on
application.*

BAXENDALES

**MILLER STREET,
MANCHESTER.**

And at LIVERPOOL, EDINBURGH and DUBLIN.

VIVIAN—Best and Cheapest Always

The charm of Poultry Keeping is
often lost through the use of
inferior appliances.

VIVIAN'S METHOD—

**QUALITY AND CHEAPNESS
ENSURES SUCCESS.**

Prices from—

£2 to £50

POULTRY HOUSES

NEW

**Illustrated List
ON APPLICATION.**

Manufacturer also of Garden
Huts, Garages, Greenhouses, Summer
Shelters, Dog Kennels, Bungalows,
and all kinds of Portable Woodwork.

F. N. VIVIAN,

Timber Merchant and Poultry Appliance Manufacturer,
254, North End Road, Fulham, London.

Established at this address 25 years.

PIGS—continued.

MIDDLE WHITE—continued.

STAPLEFORD HERD OF MIDDLE WHITE PIGS. A few choice gilts and boars Sired by Royal Winners always for sale at reasonable prices. C. S. HARVEY, Wymondham, Oakham.

WEELEY HERD OF MIDDLE WHITES, bred on the open-air system, exclusively from Champion strains. Two 1919 Royal Show winners, and the sire and dam of a 1919 Cattle Show winner were bred in this herd. Apply to OSCAR GRAY, Tendring Farms, Limited, Weeley, S.O., Essex.

SKIPWITH, Captain C., LOVERSAL HALL, DONCASTER.—Loversal herd of Pedigree Middle Whites. Bred on open air system. Moderate Prices.

LARGE BLACK.

PICKWELL HERD, Pedigree Large Blacks. Young stock from best strains at reasonable prices.—CAPTAIN CLAUDE W. HEMP, Stainbridge Farm, Bolney, Sussex.

NEWHOUSE HERD OF Pedigree Large Black Pigs. Boars and Gilts from best strains.—ROBERT FORTUNE, Newhouse, Cranleigh, Surrey.

DUNSTALL HERD of Pedigree Large Blacks, bred from prize strains under natural conditions. Prolific, hardy, grand doers and of choice type. Young Boars and Gilts. Prices Moderate.—LIONEL E. HORNE, Moreton-in-Marsh, Glos.

EDGE, S. F., GALLOPS HOMESTEAD, DITCHLING, SUSSEX.—Pedigree Large Blacks, marvellous open air strain.

GLOUCESTER OLD SPOT.

THE FAIRFIELD HERD OF GLOUCESTER OLD SPOT PIGS for Sale. 100 to choose from, including winners at Hereford and Worcester Show. Gilts, Boars and Sows with litters; also, owing to change of blood, several Boars by Berkeley Foreman.—J. B. DOWDING, Fairfield, Leominster.

POULTRY.

MAJOR, ARTHUR C.—Breeder and Exhibitor thirty years. Champion Duck and Silver Grey Dorkings, "England's best fowl." Prizes at all Shows, and exported all over the world. Prices moderate. Eggs, 1s. each.—ARTHUR C. MAJOR, Ditton, Langley, Bucks.

White Leghorns, White Wyandottes, Light Sussex. Stock bred from Laying Competition Winners. Eggs, Day-old Chicks and Stock birds for sale. Illustrated List free—JOHN CHIVERS, Estate Office, Histon, Cambridge.

MISCELLANEOUS ADVERTISEMENTS—(Cheap Prepaid).

64 Page Book about Herbs and How to Use Them, 2d.—TRIMNELL, THE HERBALIST, RICHMOND ROAD, CARDIFF.

Rippins Easy to Keep Account Books for Farmers. Herd Books for Cows and Pigs. Stud Books for Mares. Gripall Cash Book dissects income and costs of the farm from all sources. Furro Crop Account Book. Service Certificate Books for Stallions, Boars, Bulls. Milk Record Books and Pads. Poultry Account Books. Egg Laying Record Cards. Specimen rulings free.—RIPPIN & BAKER, The Newarke, Leicester.

All applications for Advertisements in "The Journal of the Ministry of Agriculture" should be addressed to C. VERNON & SONS, LTD., 38, Holborn Viaduct, London, E.C.1.

Wear Waterproof Steels

Cost less than leather; wear 3 to 6 times as long and are lighter, easier, stronger. Eliminate repairs; save pounds on your boot-bill and stop foot troubles. Prevent Colds, Rheumatism, Corns, Bunions. Keep feet warm and dry in snow, rain, mud, slush. Never change shape; fit fine and feel easy, comfortable always.

SEVEN
DAYS'
FREE
TRIAL



Send for free book
"The Sole of Steel"

with particulars of
Great Seven Days' Free
Trial "Try-on" Offer.

Send post card to-day.

N. M. RUTHSTEIN, 39, Steeleries, Northampton.

'DAK' RATLIME

FOR RAT EXTERMINATION.

Supersedes Dangerous Poisons.

Holds its victims on the spot so that they cannot get away to die under floors, etc. Is largely used by Public Authorities.

7lb. tin, 12/- post free; in cwt. quantities 1/3 per lb. Carriage forward. Full particulars on request.

Sole Makers:

KAY BROTHERS, Ltd. (Dept. J. A.),
Manufacturing Chemists, STOCKPORT.

MAXIMUM CROP PRODUCTION

IS IMPOSSIBLE

WITHOUT JUDICIOUS POTASH APPLICATIONS.

The complete series of Potash Fertilisers are only supplied by the Potash Syndicate and are always in excellent condition for sowing and mixing.

Kainit, guaranteed minimum 12·4 % Potash (but cargoes actually testing up to 15·68 %). (Also supplying common salt and Magnesia salts of proved fertilising value).

Potash Manure Salt ... 20 % Potash
" " " ... 30 % "

Sulphate of Potash—Magnesia ... 26 %
(Invaluable for Potatoes)

Muriate of Potash 80–85 % Purity 51·5 % Potash

" " " 90–95 % " 56·8 % "

Sulphate of Potash 90 % " 48·6 % "

" " " 96 % " 51·8 % "

Points about Sulphate of Potash.

(1) SULPHATE OF POTASH is usually sold with a guaranteed minimum of 48 % pure Potash.

Therefore 1 cwt. is an average dressing for 1 acre as against 4 cwt. Kainit (12·4 % minimum).

A saving in carriage and general handling is thus effected.

Besides:—

(2) SULPHATE OF POTASH can be used at sowing or planting time, early or late, without any risk of retarding germination or initial growth.

(3) SULPHATE OF POTASH has never any bad secondary effect on the soil; on the contrary, it gives rises in the soil to Sulphate of Lime which may be actually beneficial to the crop.

(4) SULPHATE OF POTASH is definitely the best Potash combination for Potatoes, it produces a "mealier" potato than the Muriate of Potash, with a higher starch content, and with superior cooking and keeping qualities.

(5) SULPHATE OF POTASH is likewise the best for Tomatoes, fruit trees, and indeed, for all horticultural crops where quality of produce is important and an excess of Chlorides might prove harmful.

(6) SULPHATE OF POTASH is dry and friable, and remains supreme for mixing with other manures, either on the farm or at the factory.

For Supplies of Potash and full Particulars, apply to:—

F. W. BERK & Co., Ltd.,
1, Fenchurch Avenue, London, E.C.3.

British Manufactured.

POTASH SALTS

Minimum 20% Pure Potash

" 14% " "

" 12% " "

POTASH

**Muriate
of
Potash**

50% and 60%
PURE POTASH.

Flue Dust

CONTAINING 18/25% SULPHATE.

SULPHATE OF POTASH.

Immediate Delivery from Stock.

For Prices and Particulars of Potash and other Fertilisers

Apply **THE BRITISH CYANIDES CO., LTD.,**
Oldbury, near Birmingham.

London Office—
49, Queen Victoria Street,
E.C.4.

**WHAT THE DAIRY SHORTHORN ASSOCIATION
DOES FOR THE DAIRY SHORTHORN BREED.**

It promotes the breeding of Pedigree Dairy Shorthorn Cattle.

It gives active support in developing their milk production to the fullest capacity, at the same time maintaining true Shorthorn character.

It encourages the development of the Breed, and upholds its claims as the great improver of stock throughout the world.

AN INNOVATION.

Registration of Dairy Shorthorn Cows for admission to Coates's Herd Book.

In order to cover a wider field, and with the object of breeding up Dairy Stock for admission into Coates's Herd Book, the Association publishes a Register of approved Dairy Shorthorn Cows with authentic Milk Records.

Entries are invited.

YEAR BOOK AND REGISTER.

The 1919 Year Book contains authentic Milk Records of 1,194 Pedigree Dairy Shorthorn Cows, with Photographs of typical animals from leading herds, and a collection of general information of special interest to Breeders of Dairy Stock; also the Second Volume of the Register containing 1,299 entries of Southern Dairy Cows and Heifers for ultimate inclusion of their progeny in Coates's Herd Book.

Copies of the Year Book and Register can be obtained from the Secretary, Price 10s. 6d.

JOIN THE ASSOCIATION.

All owners of Dairy Cattle of the Shorthorn type should become Members of the Association which is doing so much for the general advancement of their interests.

FULL PARTICULARS ON APPLICATION TO—

The Secretary, Dairy Shorthorn Association,

(Dept. 1.)

16, BEDFORD SQUARE, LONDON, W.C.1.

(Established 1905.)

FREE

Prof. Beery's Amazing New Invention.

3-in-1 Breaking Bridle

Yes, absolutely FREE! Prof. Beery's new invention is a **Breaking Bridle, a Halter and a Regular Bridle ALL IN ONE!** Works perfectly for each of these uses and can be changed from one to any other in an instant! Regular price 17/— Now yours free! Nothing like it ever before invented. Adjustable to any colt or horse. Subdues the wildest colt instantly. Quickly **masters** the most powerful and vicious horse.

Picture shows why horse must submit at once! Professor Beery's new invention is made of the best webbing ever produced—2½ times stronger than leather. Not affected by weather conditions. All metal parts of finest castings. Includes Professor Beery's famous Four-in-one Driving Bit. Complete invention is well worth twice its regular price of 17/—Read why we give it to you **ABSOLUTELY FREE!**



£25 CLEAR PROFIT!

That is what Chas. Mackley, of Unadilla, N.Y., made in 10 days! You can easily do it too. Mackley bought an awkward horse for £10. Ten days later he sold him for £35, making £25 clear profit! Beery's Secrets in Horse-Breaking and Training did the trick! In order to introduce to **you** Prof. Beery's Secrets we offer you—for only £1—the entire Condensed Course in 6 amazing lessons—and we will give you this 17/- Three-in-One Breaking Bridle **Free.** **We will accept no money** now—we want you to see with your own eyes and judge for yourself!

Mackley is only one of the many who make big money through Beery's Secrets! Mr. S. L. Arrant writes: "Just to test Beery's methods I bought the worst balky, kicking, fighting horse I could find. Paid £13 for him. After handling him only a few hours according to Beery's system I sold him for £27." Think of it! £14 clear profit in only a few hours! Scores of others are making big money like this. You can do it too!

PROFITS! PROFITS!

Not only can you pick up awkward horses and quickly make them bring you money but you can also make your own horses more safe and valuable, or you can break and train your neighbours' horses for big fees.

As proved by these and scores of other letters in our files—there is no end to the money you can make. "I made £2 in just 10 minutes," says Douglas Clark of Shubemacadie, Nova Scotia. "Dell Nicholson of Portland, Michigan, made £33 on one horse. "I made £39," writes Orphie Bishop, Bernard, Kansas. "Made £55 profit on 1 mare" says Louise McCutcheon, Ontario. "Changed a worthless balker into a £45 horse," says Dean Smith of Findlay, Ohio. "Made a horse that cost £3 10s. sell for £30," writes Everett McBook, Elkhart, Ill. And these are only a few of the letters! Beery's Secrets will mean as much to YOU. Let us put the entire 6-lesson Condensed Course into your home for Five Days' Free Examination—at a special price of only £1 **if you are satisfied!**

SEND NO MONEY

No, not a single penny! This coupon brings to you at once Prof. Beery's entire Condensed Course in Horse Breaking and Training Secrets, learned after 30 years of experience with thousands of horses. Post coupon at once and you will receive the 3-in-1 Breaking Bridle (Regular Price 17/-) Absolutely Free! If you like the Course, after 5 days' free examination, send only £1 for it—the 3-in-1 Bridle you keep Free. If you don't like the course return it with the bridle—and forget the matter.

We can make this amazing offer because nobody returns the Course of Secrets. They see right away that it will bring them money; and the 3-in-1 Breaking Bridle does such wonderful things with all kinds of horses and colts that people jump at this chance to get it free. Read the coupon—it tells the story. Fill up and Post this coupon

to-day. **Beery School of Horsemanship, 1429, Main St., Pleasant Hill, Ohio, U.S.A.**

Beery School of Horsemanship,
1429, Main St., Pleasant Hill, Ohio, U.S.A.

Send me Prof. Beery's Condensed Course in Horse Breaking and Training—6 complete lessons. I will look it over for five days and if I like it I will send you £1.

On this special offer I am to get Absolutely Free Prof. Beery's new invention the 3-in-1 Breaking Bridle.

Name.....

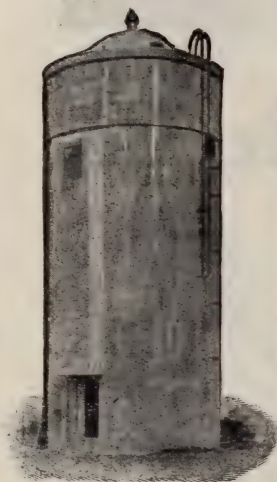
Address.....

(YOUR MONEY ACCEPTED AT FACE VALUE).

Reinforced Concrete Silos

SAVE MONEY.

The Scott Reinforced Silos are better and cheaper than Timber.



YOU can feed your stock with Ensilage at half the cost of Roots and get double the results. This is proved by our friends whom in many cases have placed repeat orders.

No upkeep required with our Silos, your initial outlay is the last and you can pay off the expense in two years.

We are Silo specialists with experience behind us and we invite you to write to us for full particulars.

Scott Silos are found all over the British Isles.

JAMES SCOTT & SON,
(ABERDEEN) LIMITED,
483-485, Union St., Aberdeen.

VICKERS FERTILISERS

*The Way
to
Profitable Farming*

COMPOUND FERTILISERS

For All Crops.

SUPERPHOSPHATES.

STEAMED BONE MEAL.

SULPHATE OF AMMONIA.

BASIC SLAG.

SULPHATE OF COPPER.

THOMAS VICKERS & SONS, Ltd.

Telegrams: "Vickers, Widnes."
Telephone 115 (2 lines).

WIDNES, LANCs.

The Netting
you will have
eventually—

FAULTLESS

BECAUSE it lies dead flat without curves or bulges and gives no trouble. It is made to stand heavy strains too, being of fine grade wire, galvanized after manufacture.

High quality and low price is another combination that makes "Faultless" the Netting you should test NOW.

Send us particulars of your requirements and we will gladly quote carriage paid prices for large or small quantities, direct from works.



David & Co.
TAFF VALE IRONWORKS
CARDIFF

HALL & CO., LTD.

Phone: Purley 10.

Lime Burners,

COULSDON, L.B. & S.C. Rly.

GROUND CARBONATE OF LIME

(For Agricultural Purposes)

20/- per Ton loaded in Bulk F.O.R. Coulsdon.
Orders should be booked at once to secure prompt delivery.

WHITE LUMP & GROUND LIME

For Agricultural Purposes.

All kinds of **CHALK** supplied from **Lump Chalk** for road making down to extremely **Fine Powdered Chalk** for Pharmaceutical purposes.

Head Office:

Victoria Wharf, E. Croydon.

Telegrams: "CEMENT, CROYDON."

Phone: "CROYDON, 1104."

ALL WEATHERS.

ALL CLIMATES.

**“ALLWEATHER”
BRAND.**

**WATERPROOF COVERS
OF ALL DESCRIPTIONS.**

Samples and Prices on application to the Sole Makers :

**JOHN SMITH & Co. (London, E.), LTD.,
44, UPPER EAST SMITHFIELD, E.1.**

Telegrams: Civilization, Ald.

Tel. No.: Avenue 7650 (4 lines).



Sheep Dip.

Paints.

Fly Spray for Cattle.

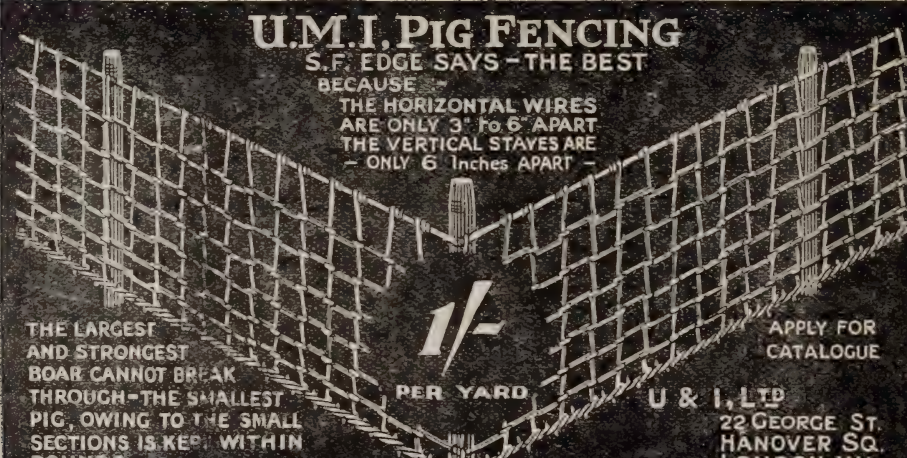
Wood Preservative.

Disinfectants.

Cattle Foods.

MURPHY & SON, Ltd., Sheen Lane, London, S.W.14.

U.M.I. PIG FENCING
S.F. EDGE SAYS—THE BEST
BECAUSE
THE HORIZONTAL WIRES
ARE ONLY 3" to 6" APART
THE VERTICAL STAVES ARE
— ONLY 6 Inches APART —



THE LARGEST
AND STRONGEST
BOAR CANNOT BREAK
THROUGH—THE SMALLEST
PIG, OWING TO THE SMALL
SECTIONS IS KEPT WITHIN
BOUNDS

1/-
PER YARD

APPLY FOR
CATALOGUE
U & I, LTD
22 GEORGE ST.
HANOVER SQ.
LONDON W1.

WHEN PLOUGHING
REMEMBER

“NAPHTHALIM”

DESTROYS WIREWORMS and all Soil Pests.
ERADICATES “CLUB,” FINGER AND TOE,
and ALL FUNGUS DISEASES.

Soil Cleansed by using

“NAPHTHALIM”

PRODUCES SOUND HEALTHY
CROPS
AND ABUNDANT HARVESTS

More necessary now than ever, to keep down
the myriads of pests resulting from the
long drought.

Full Price List on receipt of P.C.—

RENED RAY & CO.,
3, OLD MILLS, HOUNSLOW.

THE “CLAYTON”



GASSING MACHINE

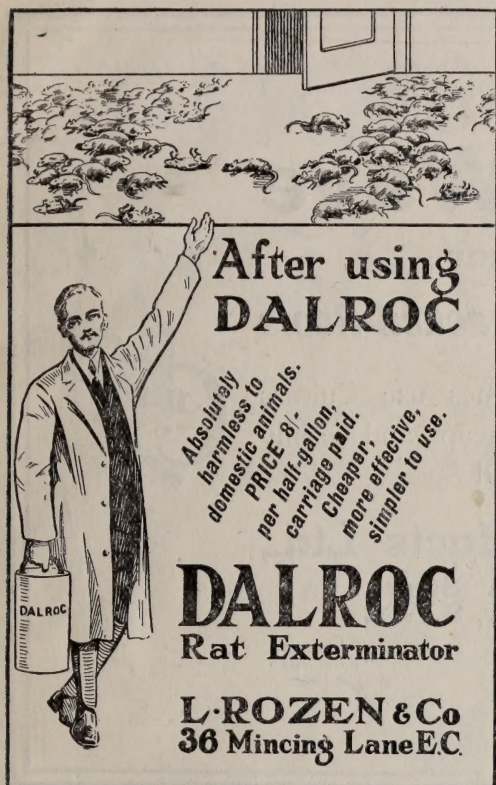
for DESTRUCTION OF RATS, RABBITS, &c.
producing sulphurous gas of high
strength without danger to operator
or domestic Animals.

Unlike Poisons, Virus and Trapping, it
Destroys not only Adult Vermin, but
also the Young in the Nests.

Used by PUBLIC BODIES, ESTATE
OWNERS, FARMERS, &c.

Full Particulars from—
CLAYTON FIRE EXTINGUISHING & DISINFECTING CO. LTD.
22, Craven Street, Strand, London, W.C.2.

Agents { RESSIGH & CAMPBELL, 118, Queen St., Glasgow.
W. O. DAY, Church House, Lord Street, Liverpool.



**After using
DALROC**

Absolutely
harmless to
domestic animals.
PRICE 8/-
per half-gallon.
Carriage paid.
Cheaper,
more effective,
simpler to use.

DALROC
Rat Exterminator

L. ROZEN & Co
36 Mincing Lane E.C.

MILK

WELFORD & SONS (DAIRIES) LIMITED.

Now open to receive offers of Reliable
Dairies of

WELL COOLED MILK.

FULL SUPPLIES OF PLATED
CHURNS PROVIDED.

CHEQUES FORTNIGHTLY.

Call or write full particulars of Summer and
Winter Quantities, Nearest Station, etc., to:

H. TROTMAN, Managing Director,
Chief Dairy Offices, Elgin Avenue,
LONDON, W. 9.

J. D. CAMPBELL,

Manufacturer of **NICOTINE** in Bond from duty-free Tobacco.

Nicotine makes the very finest Insecticide for fumigating, vapourising, or spraying to destroy insects infesting vegetation. *Your inquiries solicited.*

LUND STREET, CORNBROOK, MANCHESTER.

Lancashire, Cheshire, Shropshire & North Wales.

Messrs. BOULT, SON & MAPLES,
VALUERS, SURVEYORS, ESTATE AGENTS, AND
PROPERTY AUCTIONEERS.

Offices: 5, COOK STREET, LIVERPOOL.

Telegrams—"Acres," Liverpool.

Telephones—187 Bank—2 lines.

Estates, Farms, Residential and Business Properties only.
Periodical Sales of Property at Liverpool, Chester and Preston.

ANDREW WEIR & CO.,

Sack and Bag Manufacturers
and Merchants,

21, PARLIAMENT ST., LIVERPOOL.

Telegrams: "Weirsac."

'Phone: 895 Royal.

All applications for Advertisements in
'The Journal of the Ministry of Agriculture'
should be addressed to

C. VERNON & SONS,
38, Holborn Viaduct,
London, E.C.

PROFITABLE FEEDING!!

OUR STEAM-COOKED FOODS

FOR

PIGS and POULTRY

are prepared from

THE BEST INGREDIENTS ONLY

PERFECTLY STERILISED
AND WELL BALANCED.

PIGMEAL

MEAT MEAL

MEAT and BONE

Specialty Prepared **GREEN BONE** In Three Grades
ADULT "CHICK," MEAL.

Samples Analysis and Prices on
Application to the Makers

NATIONAL BY-PRODUCTS LTD.
Goschen Buildings,
Henrietta Street, Strand, London,
W.C.2.

Now that the Heat Wave

is over

Look out for Cracked Roofs

Before the rain comes use Cuirass
Liquid Proofing—cheap and easily
applied.



Cuirass Products Ltd.,

**69, Victoria Street,
Westminster, S.W.1.**

Telephone :
Victoria
5419.

Telegrams :
"Kwerasspro
London."

VICTORIA FENCING COMPANY, LTD.

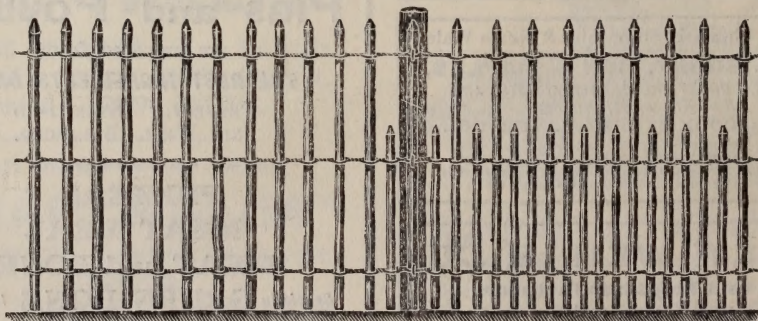
(T. W. PALMER & CO.),

5, VICTORIA STREET, WESTMINSTER, S.W.1.

Sole Manufacturers of

"VICTORIA" CLEFT CHESTNUT PALING.

PATTERN
0437



PATTERN
0438

Supplied in all heights from 2 ft. to 6 ft., and with either 2, 3 or 4 lines of wire.
The cheapest efficient fence on the market. Prices from 1/1 per yard run.
Made from best home-grown timber, carefully selected and cleft with the grain.
As durable as it is economical.

The V.F.Co. LTD. also make **OAK AND FIR FENCES AND GATES, WROUGHT IRON
FENCES AND GATES** of all kinds.

Send post card for latest Catalogue, A 21.

Works: CHURCH ROAD, MERTON ABBEY, and MILL ST., MAIDSTONE.

EPHOS BASIC PHOSPHATE

*A radio-active phosphatic fertiliser,
containing 60-65% Phosphates.*

HIGHLY SOLUBLE.



For grain and roots "EPHOS" will give results comparable to superphosphate and basic slag, while it excels both in the promotion of leaf and stem.

"EPHOS" counteracts soil acidity.

"EPHOS" is particularly well adapted for mixing in compound manures.

CROOKSTON BROS.,

38, Grosvenor Gardens, London, S.W.1.

Telegrams—"Croobros,
Sowest, London."

AGRICULTURAL LIME

To All Cultivators of Land:
USE OUR GENUINE GROUND LIME

GROUND LIME is a **FERTILISER**, and secures
HEAVIER CROPS with a **MINIMUM** of **EXPENSE**

GROUND LIME, if applied to the land in quantities of about 10 cwt. or more per acre per annum, will produce greatly augmented **CROPS**, whether of Cereals, Clovers, or Leguminous Plants.

THIS LIME is a **SOIL FOOD**, an **INSECTICIDE**, a **FUNGICIDE**,
and the **BEST REMEDY** for "**FINGER-AND-TOE**" **DISEASE** in
TURNIPS, &c.

For Prices of

AGRICULTURAL LIME **AND** **GROUND** **CARBONATE OF LIME**

Write to—

THE CEMENT MARKETING COMPANY, LIMITED,
LIME DEPARTMENT,
8, LLOYDS AVENUE, LONDON, E.C.3.

Telegraphic Address:—"PORTLAND, FEN, LONDON."

Telephone No:—5690 AVENUE (Private Exchange).